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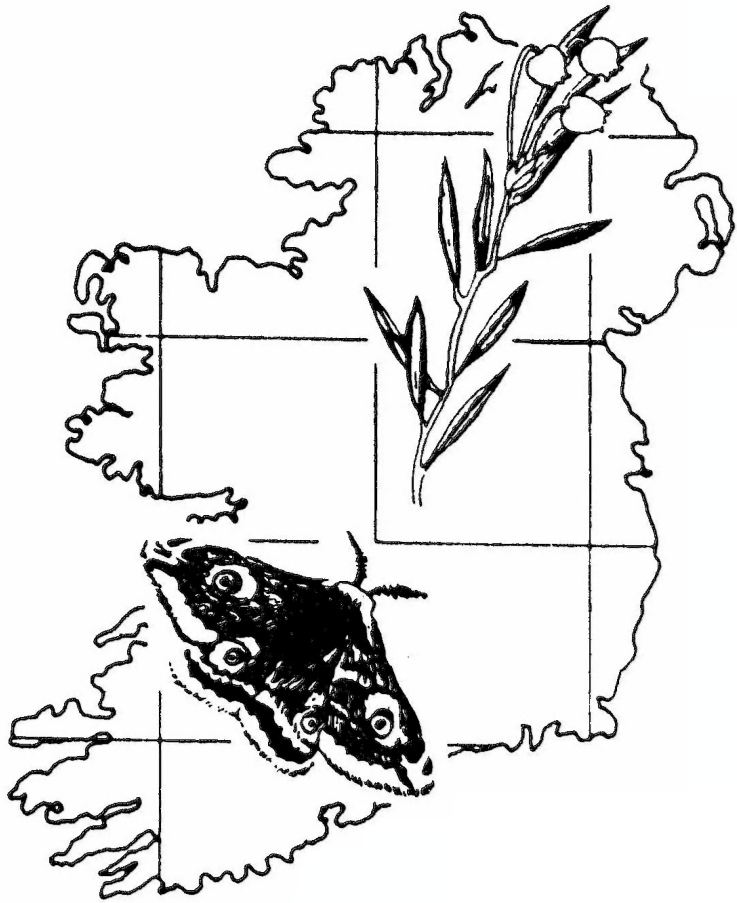

Bulletin No. 44

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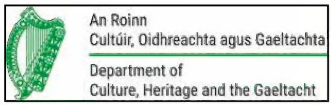

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BULLETIN OF THE IRISH BIOGEOGRAPHICAL SOCIETY
Number 44

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Editorial

Early in 2020, the Covid crisis forced a rethink of how papers accepted for *Bulletin* **44** might be published. At the time, future production could have been affected by a variety of factors including the illness of the Editor and the non-availability of printing facilities. As a result, the Committee decided that all papers would be published online on the Society's website. The first batch appeared on 1 June 2020 and the second (final) batch will be uploaded before the end of the year. As 2020 progressed, it became evident that a normal printed *Bulletin* was also possible. Our printers (Grehan Printers) are considered an essential service during lockdowns and contact has now been made with them to print the *Bulletin* on 14 December as normal. All going to plan, the issue will be posted to members by the Chairman in the spring of 2021 when our membership list has been finalised.

Despite the difficulties of 2020, *Bulletin* **44** is almost double the size of *Bulletin* **43**. The issue contains a wide variety of topics. Of particular interest is Nicholas Parry's remarkable study of the slow worms of the Burren, County Clare. This is a five-year investigation including lifestyle, habits, age and sexual dimorphism, and terrain.

Due to interest in the group, it has been possible to publish three papers on the Irish caddisflies (Trichoptera). These are joined by a paper on the Irish stoneflies (Plecoptera) by Hugh Feeley and Jan-Robert Baars. Declan Murray also continues his important research on the Irish chironomids (Diptera). Alan Walshe made the amazing discovery of a population of Water-Stick Insects in a lake in County Waterford. Declan Quigley and co-authors have three articles on their intriguing discoveries of Persian Walnuts, Nutmegs and Brazil Nuts stranded on Irish shores. Chris Malumphy joins the Editor in updating the review of the Irish Jumping Plant-Lice (Hemiptera).

Myles Nolan continues his detailed investigations of the Irish spiders (Arachnida), deleting two species from the Irish list while adding another *Cryptachaea blattea*. This spider has been spreading in Britain and continental Europe in synanthropic situations. Beetles (Coleoptera) are well represented in *Bulletin* **44**. Jervis Good and Jeremy Dorman provide a detailed account of rove-beetles from grasslands and pastures in Ireland and Galicia, Spain while Martin Cawley reports many records of uncommon Irish beetles. The author has confirmed the presence of the distinctive dung beetle *Chilothorax conspurcatus* in Ireland.

The Society published its first Occasional Electronic Publication in June 2020. Information on downloading *A National Grid Atlas of the Irish Caddisflies (Trichoptera)* will be found on page 272.

On behalf of the Society, I would like to thank the authors and referees for such an excellent Bulletin, and our sponsors whose essential financial support is greatly appreciated.

J. P. O'Connor, Editor, 22 October 2020

REVISED INSTRUCTIONS TO AUTHORS

1. Submitted manuscripts should follow the format of articles in *Bulletin* **Number 44** and other recent issues. The titles of journals should be given in full in the references. The references should be arranged alphabetically with, where relevant, Anon. appearing first.

2. Manuscripts may be submitted by e-mail to the Editor at <joconnor@museum.ie> or *via* our Treasurer Mr John Walsh at <ampersandwalsh@gmail.com>. Figures and photographs should be sent as jpegs. Complex tables should also be sent as jpegs and not in Excel. Remember that all figures and tables should be submitted in a type size which will remain legible after reduction to A5. Typed copy is still acceptable. It should be sent, on A4 paper, using double-spacing and 2.5cm (one inch) margins with the text and any figures on an accompanying compact disc or USB stick, to the Editor, Dr J. P. O'Connor, Emeritus Entomologist, National Museum of Ireland – Natural History, Merrion Street, Dublin D02 F627, Ireland.

3. Word is preferred and Times New Roman 13pt should be used.

4. Records: please ensure that, when possible, the following information is incorporated in each record included in a manuscript:-
(a) latin name of organism.
(b) statement of the reference work used as the source of nomenclature employed in the text. The describer's name should be also given when a zoological species is first mentioned in the text.
(c) locality details including at least a four figure Irish grid reference (e.g. N3946), county or vice-county and some ecological data about the collection site, plus date of capture.
(d) collector's name and determiner's name (where different from the collector's name), and
(e) altitude data should be included where relevant.

5. Each year, the closing date for submissions will be the 15 October for that year's *Bulletin*. Mss received after that date will be considered for the following year's *Bulletin*. All papers will be refereed and any major changes referred to the author(s) for consideration.

Bulletin of the Irish Biogeographical Society **Number 44** (2020)

A STUDY OF THE PRESENT STATE OF AN IRISH COLONY OF THE SLOW WORM (*ANGUIS FRAGILIS* LINNAEUS, 1758) (SQUAMATA: ANGUIDAE) IN THE BURREN, COUNTIES CLARE AND GALWAY 2015 – 2019

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Abstract

There is a colony of slow worms, the legless lizard, *Anguis fragilis* Linnaeus, 1758 (Squamata: Anguidae) in the glacial karst landscaped Burren region of Counties Clare and Galway in the west of Ireland. This is a report of a five-year investigation into the lifestyle, habits, age and sexual dimorphism, and terrain inhabited by the current population. From the total encounters of 743, the ratio of male, female and juvenile slow worms was monitored as was the possibility of a home range and repeated individual refugia preference by adult females compared to the transient habit of males. The variation of preferred habitat, the refugia employed and pertinent temperatures are also reported.

Key words: *Anguis fragilis*, slow worm, Ireland, Burren, distribution, sex ratio, gravidity, birth, lifestyle, habits, age, sexual dimorphism, terrain, refugia.

Introduction

The first slow worms (*Anguis fragilis* Linnaeus, 1758) recorded in Ireland were reported by the then schoolboy Seamus Kelly on farmland at Tulla Park, County Clare. Mr Kelly (pers. comm) recalls that it was during 1972 when he discovered two slow worms which he estimated to be at least a foot long and as thick as a finger. McCarthy (1977) suggests that they may have been mating and reported that one of them, a male, measured 34cm long and 29g weight. McGuire and Marnell (2000) in a study over a three-day period in July 1998 and also from May to October 1999, reported finding three and eighty-nine slow worms respectively.

The origin of slow worms in Ireland is not known but it is generally accepted, though without any evidence or credibility, that they were introduced from Britain during the 1970s. Common in Britain and much of Europe, slow worms are rarely seen during daylight hours even though large numbers may inhabit gardens and other publicly frequented areas. Also, being semi-fossorial, slow worms spend much time underground including during their hibernation period (Inns, 2009).

Cold blooded, slow worms require thermoregulation but, unlike the common lizard (*Zootoca vivipara* (Jacquin, 1787)) prefer to bask under sun-heated objects rather than overtly (Street, 1979). This habit facilitates the use of artificial cover objects (ACOs hereafter called covers)

when seeking them out. These covers are commonly of corrugated tin, roofing felt, carpet squares and hardboard (Riddell, 1996) and, if placed in suitable locations, will be used by the slow worms to supplement their other habitations which often include flat rocks and debris (Inns, 2009).

During the summer of 2012, I found a dead male slow worm on a lane in the townland of Derryowen, County Clare. As a result, I decided that I would try and find a slow worm in the Burren area. I began the research in Autumn 2015 and now as they hibernate at the end of 2019, my total slow worm encounters number 743.

The Burren is a mix of limestone pavement, agricultural grassland and cultivated fields with only sporadic farm and residential buildings. It has been farmed for thousands of years with land reclaimed from bare rock and hazel dominated vegetation. The area generally accepted as The Burren is bordered by the villages of Tubber, Corofin, Kilfenora, Lisdoonvarna, Ballyvaughan and Kinvara (Anon., 2020a).

A townland in the Republic of Ireland is the smallest administrative division of land containing an average area of 325 acres (Anon., 2020b).

Methods

2015. I began in the townland of Keelhilla, County Clare where, at the end of August, I placed a 50cm^2 corrugated tin to act as a cover at the base of a dry-stone wall. Nearby I happened upon a similar sized square of steel sheet in the undergrowth, an old discarded road sign, and I placed that near a dry-stone wall. These two covers remained in place over years.

2016. Cover numbers were supplemented by adding three more of similar dimensions at Keelhilla, one on farmland in the townland of Cappaghmore, County Galway, one at Cappacasheen, County Galway, two at Ballaghaglash, County Clare, three at Coolorta, County Clare, one at Creehaun, County Clare and one at Attyslany, County Clare. The total of 14 covers consisted of corrugated tin x 11, steel sheet x 1, tin sheet x 1 and carpet tile x 1.

2017. Only the original two covers were retained at Keelhilla, two additional covers were placed at Cappacasheen. Three covers were retained at Coolorta and one at Creehaun. Two were placed at Poulataggle, County Clare, three at Cloosh in County Galway and one remained in Attyslany. The total of 14 covers consisted of corrugated tin x 11, steel sheet x 1, tin sheet x 1 and carpet x 1.

2018. The two covers remained at Keelhilla. Access was regained at Cappaghmore and one cover placed. An additional three covers were placed at Cappacasheen, two were positioned on scrub farmland in Funshin Beg, County Galway, four items fit for purpose were already situated in a wild garden at Cahererillan, County Galway, two covers were positioned at Funshin More, County Galway, three at Cloonselherny in County Clare, two at Fahee North, County Clare and four at Knocknagroagh in County Clare. The total of twenty-six covers consisted of corrugated

tin x 9, steel sheet x 3, corrugated bitumen x 8, tin sheet x 2, bitumen mat x 3 and carpet x 1.

2019. The steel sheet only remained at Keelhilla, two sites were used at Rockvale, County Clare incorporating five covers, three covers were placed in Quakerstown townland, County Clare, two sites were used at Cappacasheen where three additional covers were placed totalling nine, three were placed at Killinny West, County Galway, the four remained at Cahererillan, two remained at Funshin More, three sites were utilized at Fahee North with five covers. Glencolumbkille North in County Clare received three covers. Individual covers were placed during the summer at Derreenatloghtan, County Clare, Poulataggle, County Clare and Ballybush South in County Galway. The total of 38 covers consisted of corrugated bitumen x 16, corrugated tin x 10, steel sheet x 5, tin sheet x 2, bitumen mat x 4 and carpet x 1. Covers were approximately 0.5m square other than at Cahererillan where the steel sheets were 2.5m x 1.5m and the carpet 1.5m x 0.5m. The steel sheets at Quakerstown measured 2m x 1m and 1m x 0.5m.

The terrain at the sites varied with open windswept and sparsely vegetated limestone pavement at 155m, 130m down to just 18m above sea level, Burren scrubland, wild garden, agricultural grassland, intimate sheltered copses, roadside verges and the edges of thickets with some high trees.

Any structure on site was utilized with covers placed hard up against dry-stone walls, under thick briars and bushes, tucked into dense hedgerows and adjacent to any feature that might receive some sunshine and offer shelter to vulnerable reptiles during daylight hours. The main vegetation at these sites comprised bracken (*Pteridium aquilinum*), heather (*Erica cinerea*), ivy (*Hedera helix*), nettles (*Urtica dioica*), blackthorn (*Prunus spinosa*), buckthorn (*Rhamnus cathartica*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*), various grasses and wild flower spp., juniper (*Juniperus communis*), ash (*Fraxinus excelsior*), goat willow (*Salix caprea*) and brambles (*Rubus fruticosus*).

Along with the covers, all manner of natural and human miscellanea that might also be employed by slow worms were checked. These items included planks of wood, off-cuts of hardboard, bits of tin or metals, scrap roofing felt and plastic sheet. Looking under stones in the Burren, a recommended method, was only briefly practiced being considered environmentally detrimental.

During 2015, I checked the covers initially on 4 September and finally on 9 October when hibernation was assumed. In 2016, the placing and checking of covers began in March until October, in 2017 February through to October, in 2018 early March to late October and in 2019 placing and checking of covers began in early February and concluded in early November when hibernation was assumed. For statistical accuracy I endeavoured to monitor all the covers at least twice, but more usually three times weekly.

On the visits during 2015, 2016 and 2017, the date and time each cover was checked, the air

temperature at that time and the weather conditions along with details of any slow worms found were recorded. The daily minimum and maximum air temperatures were also noted. Additionally, during 2018 and 2019, the temperature of each cover was recorded whether slow worms were present or not.

The timing of visits was varied on an *ad hoc* basis, for example whether the mid-morning sun after a wet night affected encounter numbers or the value of heavy cloud in late afternoon during periods of hot weather. Covers were not checked during torrential rain or storm conditions though they were should snow lie on the ground and during periods of frost. To facilitate repeat sightings certain covers were left in place over the entire study or, if removal was necessary, replaced in late winter.

It immediately became apparent that my initial results inferred an imbalance according to various research papers regarding the ratio of male to female encounters. Consequently, I was vigilant in recording the sex of each adult. Although individual identification was not always possible, the marking and colouration of animals was usually sufficient for gender assessment. Young slow worms were allocated either adult or juvenile status dependent on their markings and colour thus sub-adult classification was not implemented.

A photograph was taken of each slow worm where possible with a Panasonic Lumix TMZ-T25 10x and downloaded onto a computer. It is a habit of slow worms, even when in darkness under covers, to bury their head into vegetation therefore often obscuring the important individual markings of head and neck areas. Also, in warm weather the disturbance of lifting the cover would occasionally result in a rapid departure though they would often return within minutes. To minimise disturbance, particularly to facilitate repeat sightings, no slow worm was ever picked up.

Results

2015. Keelhilla, two covers produced 13 encounters from 4 September to 9 October. Corrugated tin 13, steel sheet 0.

Of 13 encounters: Male 1; Female 12; Juvenile 0. Repeat sighting F#1, F#2.

2016. Keelhilla, five covers produced 82 encounters from 4 April until 26 September. The five covers had 76 slow worms, two were seen openly basking and 4 were found under stones. Corrugated tin 76, steel sheet 0.

Cappacasheen, one cover produced 15 encounters from 18 August until 29 September. Tin sheet 15.

Cappaghmore, one cover produced 22 encounters from 14 July to 31 August. All were classed as juveniles. Corrugated tin 22.

Ballaghaglash, two covers produced none but an openly basking female was noted partially exposed in sphagnum moss adjacent to a cover. Corrugated tin 0.

The covers at Coolorta, Creehaun, and Attyslany resulted in no sightings.

Of 120 encounters: Male 6; Female 44; Juvenile 70. Repeats F#1 (2nd year), F#2 (2nd year). Regularly seen F#18, F#32, F#58.

2017. Keelhilla, two covers produced 13 encounters from 31 March to 25 August. Corrugated tin 9, steel sheet 4.

Cappacasheen, three covers produced 43 encounters from 9 March to 26 September. Tin sheet 26, corrugated tin 17.

The covers at Coolorta, Creehaun, Poulataggle, Cloosh and Attyslany produced no sightings.

Of 56 encounters: Male 0; Female 53; Juvenile 3. Repeats F#1 (3rd year), F#58 (2nd year). Regularly seen F#65, F#68, F#69.

2018. Keelhilla, two covers produced 13 encounters from 16 May to 26 September. Corrugated tin 6, steel sheet 7.

Cappacasheen, six covers produced 78 encounters from 8 April to 15 October. Corrugated tins 43, tin sheet 15, corrugated bitumen 7, bitumen mat 13.

Cahererillan, four covers produced 54 encounters from 21 May to 21 September. Steel sheets 44, tin sheet 6, carpet 3. 1 dead.

Cappaghmore, one cover produced three encounters. Corrugated bitumen 3.

Funshin Beg, two covers produced two encounters. Corrugated bitumen 2. The covers were removed when the slow worms were recorded.

No slow worms were found at Cloonselherny, Funshin More, Fahee North and Knocknagroagh.

Of 150 encounters: Male 8; Female 90; Juvenile 52. Repeats F#58 (3rd year), F#65(2nd year), F#68 (2nd year). Regularly seen F#97, F#107, F#115.

2019. Keelhilla, One* cover produced 10 encounters from 23 March to 13 September. Steel sheet 10. *The corrugated tin was vandalised (burned) and therefore removed.

Cappacasheen site A, six covers produced 205 encounters from 20 February to 13 October. Tin sheet 49, corrugated tins 101, bitumen mats 55.

Cappacasheen site B, two covers produced 16 encounters from 3 May to 17 October. Corrugated bitumen 11, debris (hardboard and wood plank) 5.

Cahererillan, four covers produced 120 encounters from 25 February to 17 October. Tin sheet 19, steel sheets 90, debris (scrap felt and plastic) 11, carpet 0.

Quakerstown, three covers produced 49 encounters from 22 July to 23 October. Corrugated tin 17, steel sheets 26, debris (wood plank, broken concrete) 6.

Killinny West, three covers produced one encounter on 3 August. Corrugated bitumen 1. The covers were removed when the slow worm was recorded.

Derreenatloghtan (1) cover had 1 encounter on 17 September. Corrugated tin 1. Cover removed when slow worm recorded.

Sundry sightings - Leitra, under a wheelie bin, 1 encounter; Ballybornagh, while crossing a lane, 1 encounter.

No slow worms were found at Rockvale, Funshin More, Glencolumbkille North, Fahee North, Ballybush South or Poulataggle.

The 404 encounters in 2019 consisted of Males 30, Females 222 and Juveniles 152. Repeats F#58 (4th year), F#65 (3rd year), F#68 (3rd year), F#97 (2nd year) F#115 (2nd year), J#116 (2nd year), J#121 (2nd year), others regularly seen F#135 x 28, F#145 x 17, F#152 x 11. A breakdown of the encounters by year is as follows: -

2012. Total encounters 1 M 1 (not included in total).
2015. Total encounters 13 M 1, F 12.
2016. Total encounters 120 M 6, F 44, J 70.
2017. Total encounters 56 M 0, F 53, J 3.
2018. Total encounters 150 M 8, F 90, J 52.
2019. Total encounters 404 M 30, F 222, J 152.

Repeat sightings

There appeared to be a discrepancy with the ratio of adult sexes during the present study compared to previous research which suggested a female to male encounter bias ratios of approximately 2/1. Examples being F/M 49/26 (Fish, 2016), the previous Burren study 31/18 (McGuire and Marnell, 2000), 186/81 (Hubble and Hurst, 2015) and 72/33 (Platenberg and Langton, 1996). The closest ratio to my result was a ratio of 67/12 during a relocation check when the numbers of repeatedly sighted females were noted (Fuke, 2011). This discrepancy may be attributed to the number of repeatedly sighted females in my research. Generally, it would seem that F/M ratio might be expected at approximately 2/1, whereas I consistently discovered 9/1.

The most notable attendees were the following slow worms. Female #58, first encountered in August 2016 and thereafter on numerous occasions each year to date (2019). Of photographs of F#58 submitted for confirmation to the Herpetological Society of Ireland the results were positive dated 14 August 2016, 18 August 2016, 29 September 2016, 8 May 2017, 30 June 2017, 4 August 2017, 21 August 2017, 6 August 2018, 31 August 2018 and 20 February 2019. Discarded were 11 poor quality images lacking identifiable markings and a further five that were likely to be female #58 but could not be confirmed. Since then, she was also encountered on 8 August 2019 in company with two gravid females though she was not herself.

Female #65 was the first inhabitant of the steel sheet at Keelhilla, a cover that had remained unused for 22 months before her attendance, having been placed in late August 2015. Female #65 appeared on 2 June 2017, 9 August 2017, 13 August 2017, 25 August 2017, 16 May 2018, 22 May 2018, 18 June 2018, 22 August 2018, 7 September 2018, 5 August 2019 and 29 August

2019. Only two other adults and one juvenile were encountered there. Female #68 was encountered during 2017, 2018 and 2019. Other multiple sightings occurred under a bitumen mat during 2019 when there was of a total 47 encounters, F#135 contributed 28 of these.

Other notable specimens repeatedly seen were F#68 2017, 2018 and 2019, F#97 2018 and 2019, and juvenile #116 from birth 2018, through spring and autumn 2019. Juvenile #121 born September 2018 was again encountered April 2019 and September 2019. Total encounters from a specific cover could mean just one or maybe two individuals e.g. the small steel sheet at Quakerstown placed in June 2019 totalled 14 encounters by year-end, 11 were of (gravid) female #152 thus distorting any estimated population figures.

Over the five years, townlands that produced slow worms were Derryowen, Keelhilla, Ballaghaglash, Quakerstown, Derreenatloghtan, Ballybornagh and Leitra in County Clare and Cappacasheen, Cappaghmore, Funshin Beg, Cahererillan and Killinny West in County Galway

And those that did not yet produce any slow worms were Attyslany, Coolorta, Creehaun, Knocknagroagh, Rockvale, Glencolumbkille North, Poulataggle, Fahee North and Cloonselherny in County Clare and Ballybush South, Cloosh and Funshin More in County Galway.

The area the slow worms were discovered inhabiting measured approximately 44km^2 in extent. In comparison, McGuire and Marnell (2000) reported coverage of approximately 17km^2

According to Froglife (1999), because of the number of covers used in this study, the frequency that they were checked and the period of time involved, the results did indicate a 'likely absence' of slow worms in all the sites that did not produce individuals. According to local knowledge and reliable reports, slow worms had been discovered at Glencolumbkille North and Fahee North previously.

2019 is shown as an example of cover preference due to the fair representation of materials used that year (Fig. 1). Of a total number of 38 covers, twenty failed to produce a result. The successful covers and debris materials are noted here. Metals were clearly favoured with corrugated tin, steel sheet and tin sheet the top three. Corrugated bitumen gave a poor return with various debris materials preferred.

Sex ratio of encountered slow worms

Individual females were encountered regularly through each summer with some being observed over two, three and four years. They would usually appear under a specific cover even though weeks or months elapsed between attendance. Adult males were rarely seen on more than six occasions and at most over just five or six weeks (Fig. 2).

As with adult males, sub-adults were similarly transient, inhabiting a cover for just a few weeks before absenting. Various new-born slow worms were seen to inhabit the same covers from their birth in late August or September until hibernation only to reappear the following

spring, remaining there for much of that summer, often into Autumn and their second year.

The movement habits of the sexes resulted in the following encounter ratios: -

2015 Male 1, Female 12, Juvenile 0. Juvenile percentage 0%
2016 Male 6, Female 44, Juvenile 70. Juvenile percentage 58.3%
2017 Male 0, Female 53, Juvenile 3. Juvenile percentage 5.66%
2018 Male 8, Female 90, Juvenile 52. Juvenile percentage 34.67%
2019 Male 30, Female 222, Juvenile 152. Juvenile percentage 37.6%

A female encounter bias of 9.35 to 1.

Gravid females

During 2019, a total of 49 encounters were recorded at the tin sheet Cappacasheen 1 with the initial sighting on 20 February (Fig. 3). From that date until 5 July, during which time 40 checks were made, ten slow worms were encountered, all single sightings only one of which was male. From 6 July to August 11 that cover was checked on 13 occasions with the total number of slow worms encountered 32. All bar one was gravid, plus one juvenile. The visits comprised one blank visit, on four occasions two were present and on eight occasions three were there. Average cover temperature was 31°C, with 30°C or more on eight visits and top temperature 38°C on three visits. From 13 August until the final search on 23 October just six single sightings were made, the last on 9 September. Cover temperatures pre 6 July and post 11 August averaged 28.5°C with a low of 17°C and a high of 43°C.

Gravidity and birth

At Cahererillan site, the latest gravid female sighting was made on 19 August 2019. New-born appeared there on 4 September. At Quakerstown site, a female was still gravid on 6 September 2019. She next appeared under her particular cover on 20 September having birthed. New-born appeared there on 17 October. At Keelhilla, F#65 was gravid on 24 August 2018. On 7 September she had birthed. The first new-born was observed on 26 September.

Length

Although the longest slow worms are said to be female, the longest one that I discovered was a male of 43cm which incidentally had blue spots, a rare colouration. It is interesting that this pigmentation exists in this Irish population. The second longest was also a male and was the second of only two blue spotted animals discovered to date. Many females were longer than 35cm with one at 41cm and the new-borns measured in September and October 2019 averaged 8.9cm. At one-year old juveniles measured 16.8cm and at two years 21.2cm. To measure the length of a slow worm, a short piece of tailor's tape was placed adjacent to the animal and a

photograph taken.

Ants and other cover inhabitants

Within hours, certainly days of placing a cover, colonies of ants would form, mainly *Formica* sp. but also *Myrmica rubra* (Linnaeus, 1758) and sometimes both. These colonies would be so active that it seemed impossible for a slow worm to exist within the writhing mass, but they did. Slow worms were regularly discovered partially buried in the soft ant-worked soil where they would emerge from or disappear into upon disturbance. The soft soil was also utilized to best effect by juveniles. Under one cover Common Carder bees (*Bombus pascuorum* (Scopoli, 1763)) had nested in the moss of an old mammal's nest. A particular slow worm, F#84, spent the summer sharing that nest. A remarkable sight to see bees leaving the nest with a slow worm in among them with much of its body length inside the nest. Ants were still active when covers were checked on 29 December 2019.

Other sightings under covers were Wood mice (*Apodemus sylvaticus* (Linnaeus, 1758)), Common frog (*Rana temporaria* Linnaeus, 1758), Pigmy shrew (*Sorus minutus* Linnaeus, 1766), Bank vole (*Myodes glareolus* (Schreber, 1780)), Smooth newt (*Lissotriton vulgaris* (Linnaeus, 1758)) and many Common lizards (*Zootoca vivipara*) of varying ages. Numerous invertebrates were found including in October mating pairs of Devil's Coach Horse (*Ocypus olens* (Müller, O.F., 1764)) (Coleoptera: Staphylinidae). Over the study period 24 species of butterfly were observed, many in defined localities, such was the diversity of habitats populated by slow worms.

Discussion

Although there is no evidence, the slow worms in the Burren are regarded as introductions. Slow worms have been noted at various venues across Ireland over many years and these sightings are probably attributed to their previous availability as pets. The vast open wild countryside of Ireland, uninhabited and rarely, if ever visited, could hold colonies. Video footage shows a slow worm in a garden during 2014 in the midlands. Why was it there and how did it get there? Dare I suggest that it, and others live there, and have done for decades. A reliable sighting was made during 2018 on Inishmaan in the Aran Islands (Anon., pers. comm.) and in the Mayo hills (Harris, 2015). Animals are not known to exist until someone reports them and I expect other colonies, currently unreported, will eventually come to light.

It appears that in the Burren region slow worms, females at least, have what might be loosely termed a home range without the author knowing where and how far this zone extends. Individual covers were frequently discovered occupied by particular slow worms both regularly and sporadically over time. This behaviour immediately became apparent during the initial period in 2015 when two females constituted twelve of thirteen encounters. The fact that

recognizable individuals would appear for a few days or weeks under a certain cover only to vacate for further varying periods indicates the use of other, alternative stations within their domain. Is it scent that guides them?

Males were seen considerably less frequently than females. Males also lingered for shorter periods under covers with six weeks the lengthiest period any male was repeatedly encountered. Whereas juveniles would be encountered in their first and second years, older juveniles and those that would be classed as sub-adults were also rarely seen over any period. Are the males and young females seeking out new territory to increase the range of the species and to prevent inbreeding of a closed colony (Haley, 2014)?

The inference, due to the fact that the colony lives in the general area, is that the Burren, a limestone dominated region, is a preferred habitat for slow worms. The authors of the previous survey (McGuire and Marnell, 2000) suggest that 'limestone outcrops' are one of the elements that contribute to habitat suitability. Now, I am convinced that it is not. To quote McGuire and Marnell (*op. cit.*) 'Based on preliminary findings of the present study, however, it appears that mosaics of open and well vegetated habitats such as calcareous grassland and scrub with outcrops of limestone pavement, offer the diversity of vegetational structure and the thermal conditions that best suit the slow worm in the Burren region'.

It appears, through the results of cover placement at a variety of habitats over several years, that the limestone pavement is an unattractive one and that the larger colony of slow worms exist in purely vegetated areas. Verdant grassland, deep rich hedgerows and dry-stone walls smothered in herbage and thickly foliaged areas of garden are preferable. They also suit an abundance of food items in the form of invertebrates. The vast expanses of limestone pavement contain little structure and vegetation other than dry-stone walls and sparse scrub and contribute few individual slow worm encounters with female re-sightings and juveniles the main contributors to the encounter totals.

There are fertile 'oasis – like' areas within the vast pavement, vegetated with grasses, shrubs, bushes, trees and some structure or feature and these pockets are more highly populated than the harsh grey featureless and windswept rock. In contrast, areas in the general vicinity or towards the (generally accepted) edge of the Burren, or those that have been cleared of rock for farming and housing or naturally limestone free, comprising lush vegetation in gardens, fields and thick hedgerows showed a habitat preference for slow worms with a population expansion year on year.

These lush, damp areas certainly offer more suitable habitat for the food of slow worms, the invertebrates, slugs such as *Derocerus* sp. (Inns, 2009) in particular and snails than open barely vegetated crag. The only positive with limestone is that the stone retains heat and in winter the ground temperature rarely drops below 6°C but at that time the slow worms are in hibernation. Cahererillan has an area with no surface limestone, richly vegetated with farmed grassland,

dense hedgerows, bushes and trees, where a very large part-cultivated/part-wild garden has been available to access during 2018 and 2019. The owners, very keen gardeners, only noted their first slow worm six years ago. Using only the facilities that were already in place, I encountered 54 and 120 animals over those two summers.

Are slow worms slowly migrating out of the harsh limestone pavement into more richly vegetated areas far more suited to their cryptic and semi-fossorial life style than open windswept and barely vegetated crag?

A comparison of 'grey' limestone sites to vegetated 'green' sites during the 2019 season:- Keelhilla RS (a grey site) – 1 cover - 10 encounters; Cappacasheen 3 (a grey site) - 3 covers - 16 encounters; Cappacasheen 2 (a green site) - 5 covers - 156 encounters and Cahererillan (a green site) - 4 covers - 120 encounters.

Heavy cloud appears to be a major positive for encountering slow worms under covers. During periods of very warm weather and bright sunshine, covers that availed of some shade produced the most sightings. Even with very warm air temperatures, heavy cloud reduced the surface temperatures of covers as did the shade of bushes, tree canopy and even a large picnic table on top of a steel sheet. The table required removal prior to checking under the steel sheet. This sheet was often 10°C cooler than an exactly similar uncovered sheet next to it. The difference in slow worms inhabiting the two sheets was considerable. Slow worms certainly seek out the area of any cover that was most appropriate, temperature wise. A cover surface can have varying temperature areas due to a variety of factors such as vegetation around the edges (a popular venue of juveniles), canopy shade, even pooled rainwater.

Covers holding gravid females were checked at least every three days during July, August and into September in the hope of sighting a new born clutch. All females remained in position during this period with only occasional temporary absence. Then one by one they departed the covers, some returning days later obviously having birthed elsewhere.

Are slow worms on the increase? Two sites give an indication. The four covers at Cahererillan in 2018 produced 54 encounters over 48 visits while in 2019, they produced 120 encounters over 44 visits. The six covers at Cappacasheen in 2018 produced 78 encounters while in 2019, they produced 205 encounters.

On 22 March 2017, F#58 was discovered under her cover at 13:50 h with pockets of snow still on the ground an air temperature at 9°C and a night temperature of 3°C. Six days later she was there again, part buried in soft ant soil with an air temperature of 14°C at 14:30 after a night temperature of zero. On 20 February 2019, F#58 made her first appearance of that year after a night temperature of 3°C. Was she emerging from underground as the cover warmed or was the ant worked soil of a suitably comfortable temperature for her to lie in? Had she spent the winter burrowed within the friable soil? Slow worms of all ages were regularly found partly submerged

in the soft soil during all summers.

Juveniles also use the ant worked soil and they disappear into what has often become a deep dry dust when disturbed. Two juveniles in particular appeared to spend the first two years of their lives in or on the tilth of a particular cover and into which they would disappear when disturbed. Are they buried there all winter? Will I find them there in 2020? Many slow worms appeared to be asleep when a cover was lifted. Perhaps thermoregulation is simply an added but very important benefit of covers, a unit more suited, actually tailor-made, to their requirements than the natural substances of stones, wood or discarded debris. When is a cover a thermoregulation unit and when is it a shelter? The fact that covers are usually placed adjacent to thick cover and thus safety, must make them desirable. Do slow worms bask in the sun more than we think? Of the total of 743 encounters, only four were in the open. How many did I walk past?

In conclusion. I set out to find a slow worm with no plan. The search then took on its own shape and, without a scientific background or any expert assistance, I hope that five years of potentially valuable study have not been wasted.

Acknowledgements

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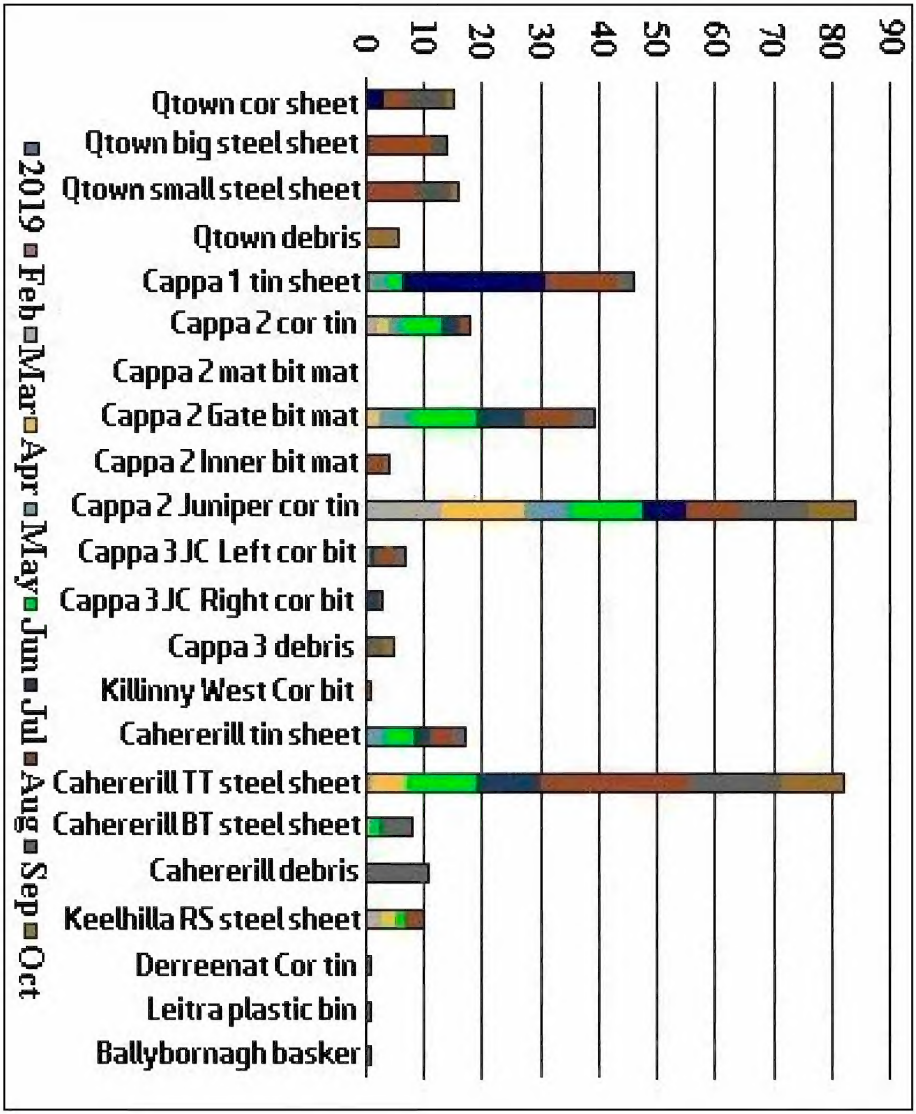

FIGURE 1. Cover preference in 2019.

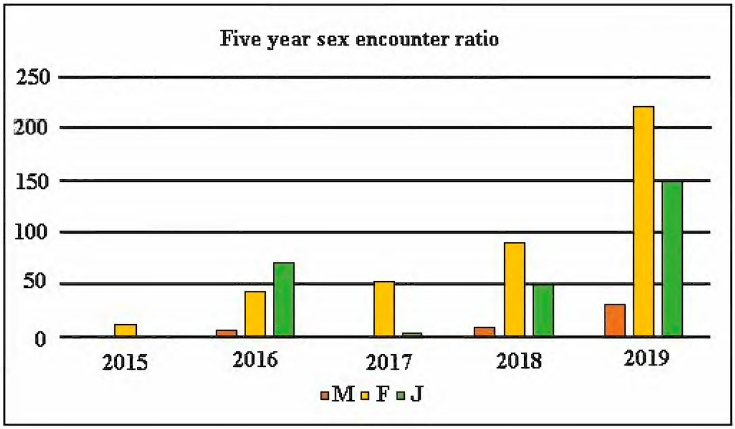

FIGURE 2. Sex encounter ratio chart, 5 years.

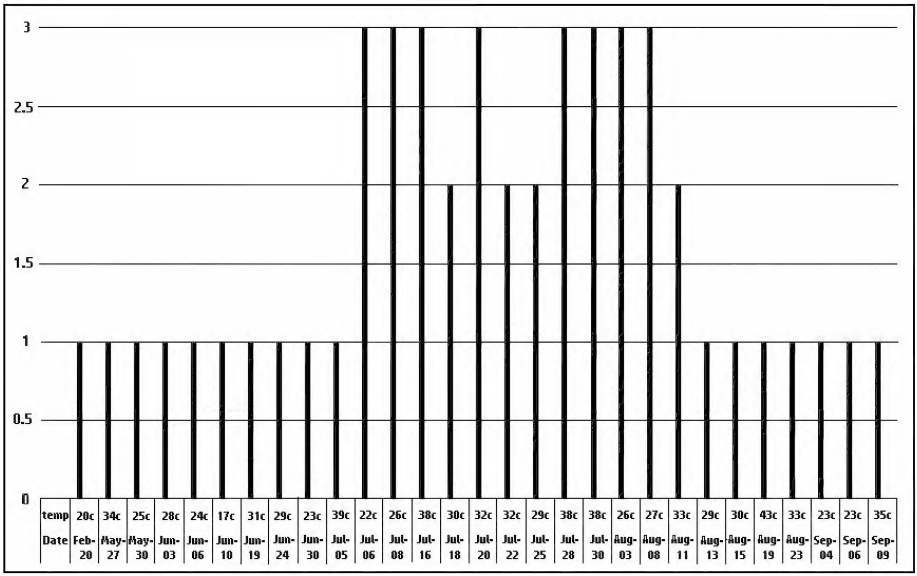

FIGURE 3. All 2019 Cappacash 1 tin occupation with cover temperatures in ^{0}C emphasising gravid female use during July and August 2019.

PLATE 1. Male slow worm (*Anguis fragilis*), with blue spots, the Burren, Ireland, 24 September 2019. Photograph © Nicholas Parry.

PLATE 2. Female slow worm (*Anguis fragilis*), the Burren, Ireland, 3 August 2018. The tin cover had just been removed. Photograph © Nicholas Parry.

ADDITIONAL CADDISFLY (TRICHOPTERA) RECORDS FROM IRELAND INCLUDING NEW RECORDS OF *OXYETHIRA MIRABILIS* MORTON, 1904

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Abstract

Since the last review by O'Connor and O'Connor (2019), new distributional data for many species of Irish caddisfly are provided along with updated maps for most of the listed species. The second and third Irish records of *Oxyethira mirabilis* Morton, 1904 are reported. A total of 56 new county records are noted.

Key words: Trichoptera, caddisflies, Ireland, new records, distribution, *Oxyethira mirabilis* Morton, 1904.

Introduction

Further progress has been made in establishing the distribution of the Irish caddisflies (Trichoptera) since O'Connor and O'Connor (2019). The new data are presented here including the second and third Irish records of *Oxyethira mirabilis* Morton, 1904. A total of 56 new county records are noted. The Irish counties are shown (Fig. 1). Four figure (1km^2) Irish grid references are given for each record and these can be easily located on the Discovery series of maps from the Ordnance Survey of Ireland.

The known distributions of many of the species are summarised on latitude and longitude maps with 10km^2 dots plotted using DMAP for converting the Irish grid references. The more significant recent records are indicated by arrows. Unless otherwise stated, specimens were identified by the senior author. The specimens were determined using Edington and Hildrew (1995), Wallace, Wallace and Philipson (2003), Malicky (2004), Barnard and Ross (2012), Waringer and Graf (2011), Salokannel and Mattila (2018) and Neu (2019). Voucher material of the rarer species has been retained in the O'Connor collection.

"Addendum 3" and "Addendum 4"

"Addendum 3", which added records cited in O'Connor and O'Connor (2019) to the dataset "Caddisflies (Trichoptera) of Ireland", was uploaded by the National Biodiversity Data Centre on the 9 March 2020 <https:// maps.biodiversityireland.ie/Dataset/250> (O'Connor, 2020). They and the other records may be viewed either on National Grid or latitude/longitude maps. Addendum 3 included some unpublished records from John Brophy and one unpublished record

of *Hydroptila lotensis* which are in the present paper. "Addendum 4", with all the remaining records, will be sent to the Centre for incorporation into the dataset in due course.

Distribution data

Unless stated otherwise, comments on distributions are based on data in O'Connor (2015), O'Connor and O'Connor (2016, 2017, 2018, 2019).

The records

RHYACOPHILIDAE

***Rhyacophila dorsalis* (Curtis, 1834) (Fig. 2)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 31 larvae 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 6 larvae 24 October 2002. Bridge on river near Spancelhill (R3880), 6 larvae 4 March 2003. Broadford River, near Scotts Bridge (R6172), 17 larvae 24 October 2002. Glendine River, Knockloskeraun Bridge (R0577), 8 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 11 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 157 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 7 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 18 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 14 larvae 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 11 larvae 11 February 2003. Eanymore Water, bridge south-west of Letterbarra (G8882), 17 larvae 5 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Glenveagh National Park (C0018), 1♂ 10-30 July 1998, Malaise trap on blanket bog and cutover bog and 1♂ 10-30 July 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane unimproved grassland along a river, M. C. D. Speight. Gweebarra River, Pollglass Bridge (B9413), 14 larvae 15 October 2002. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 6 larvae 14 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DUBLIN: Owendoher River, Bohernabreena (O1322), 1♂ 19 May 2019, collected & determined J. T. Brophy. River Dodder, upstream of the reservoir (O1120), 29 larvae 7 March 2003. River Liffey, downstream of Ballyward Bridge (O0216), 13 larvae 7 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 25 larvae 21 February 2003. Duniry River, south-west of Duniry (M7209), 32 larvae 7 November 2002. Owendalulleegh River, ford at Inchamore (R5699), 64 larvae 7 November 2002. Owenglin River, bridge south-west of Clifden Lodge (L6750), 15 larvae 20 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Rosroe [Barrna-nOra] (L7541), 7♂♂4♀♀ 28 April-19 May 1994, 38♂♂6♀♀ 29 July-10 August 1994 & 13♂♂4♀♀ 21 September-7 October 1994, Malaise traps at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 2♂♂1♀ 1-21 July 1995 & 5♂♂ 1-21 August 1995, Malaise traps on moor, *Ulex* thickets and unimproved montane non-calcareous grassland with a stream in a gully, M. C. D. Speight. Owenmore River, bridge at Boherboy (Q5110), 21 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 22 larvae 25 June 2003. River Flesk, bridge near Glenflesk (W0685), 6 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 9 larvae 16 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 35 larvae 8 November 2002. River Bilboa, north-west of Doon (R8151), 131 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Ballycroy (Mayo) National Park (F9403), 1♂ 1-20 August 1997, Malaise trap on open, grassy trackside within a *Pinus* plantation beside the Gennamong River which flows through bogland, M. C. D. Speight. Clydagh River, near Burren (M1496), 45 larvae 31 October 2002. Cregganlar River [Behy], bridge south-west of Bunnyconnellan (G3217), 70 larvae 14 February 2003. Keerglen River, bridge north-east of Doondragon (G0933), 6 larvae 18 February 2003. River Moy, at Bleanmore (G2600), 5 larvae 19 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 11 larvae 17 October 2002. Dunneill River, near Dromore West (G4334), 11 larvae 17 October 2002. Gowlan River, upstream of the confluence with the Easky River (G3826), 27 larvae 17 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 28 larvae 17 October 2002. Owengarve River, ford north-west of Srah Upper (G5503), 56 larvae 30 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 47 larvae 17 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 39 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TYRONE: Cottage Farm BioBlitz, River Strule, Tattynure (H4380), adult 15 August 2015, collected CEDaR staff, determined A. Niven (NBN, 2020).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 22 larvae 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 25 larvae 25 February 2003. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 15 larvae 18 March 2003. Little Slaney, ford south of Coan (S9891), 42 larvae 29 November 2002. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 20 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 10 larvae 26 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Rhyacophila munda* McLachlan, 1862 New to County Sligo (Fig. 3)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 8 larvae 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 1 larva 24 October 2002. Bridge on river near Spancelhill (R3880), 2 larvae 4 March 2003. Broadford River, near Scotts Bridge (R6172), 1 larva 11 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 1 larva 12 March 2003. Sullane River, Linnamilla Bridge (W3172), 3 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Eanymore Water, bridge south-west of Letterbarra (G8882), 3 larvae 12 February 2003. Gweebarra River, Pollglass Bridge (B9413), 4 larvae 15 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DUBLIN: River Dodder, upstream of the reservoir (O1120), 8 larvae 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Shanganagh River, Kilternan (O2021), 1♀ 23 September 2019, collected & determined J. T. Brophy.

GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 5 larvae 12 June 2003. Owendalulleegh River, ford at Inchamore (R5699), 7 larvae 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Owenriff River, Oughterard (M1142), 1♂ 23 August 2015, 15W Actinic light-trap, M. P. Gammell.

KERRY: Owenmore River, bridge at Boherboy (Q5110), 1 larva 24 June 2003. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 2 larvae 12 March 2003. River Flesk, bridge near Glenflesk (W0685), 1 larva 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 3 larvae 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: River Bilboa, north-west of Doon (R8151), 1 larva 5 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Ballycroy (Mayo) National Park (F8607), 1♂ 1-20 August 1997, Malaise trap on an open grassy trackside within a *Pinus* planatation. M. C. D. Speight. Cregganlar River [Behy)], bridge south-west of Bunnyconnellan (G3217), 18 larvae 9 June 2003. Keerglen River, bridge north-east of Doondragon (G0933), 6 larvae 9 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 1 larva 10 June 2003. Dunneill River, near Dromore West (G4334), 3 larvae 10 June 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 12 larvae 19 February 2003. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 9 larvae 9 June 2003. Owengarve River, ford north-west of Srah Upper (G5503), 6 larvae 10 June 2003. River Moy, bridge south-east of Cloonacool (G4916), 1 larva 9 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 9 larvae 23 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 15 larvae 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 4 larvae 27 June 2003. Little Slaney, ford south of Coan (S9891), 3 larvae 27 June 2003. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 8 larvae 26 February 2003. River Slaney, Waterloo Bridge (S9093), 1 larva 3 July 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GLOSSOSOMATIDAE

***Agapetus delicatulus* McLachlan, 1884 New to County Sligo (Fig. 4)**

CLARE: Graney River, Caher Bridge south of Lough Graney (R5590), 3 larvae 12 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Eanymore Water, bridge south-west of Letterbarra (G8882), 1 larva 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 1 larva 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KERRY: River Blackwater, Gearha Bridge, west of Kenmare (V7872), 1 larva 12 March 2003. River Flesk, bridge near Glenflesk (W0685), 1 larva 24 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 1 larva 25 June 2003. River Bilboa, north-west of Doon (R8151), 1 larva 5 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, near Dromore West (G4334), 1 larva 13 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 9 larvae 23 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: River Slaney, Waterloo Bridge (S9093), 2 larvae 3 July 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Agapetus fuscipes* Curtis, 1834 (Fig. 5)**

CLARE: Bow River, Bow River Bridge (R6687), 1 larva 5 March 2003. Bridge on river near Spancelhill (R3880), 15 larvae 4 March 2003. Glendine River, Knockloskeraun Bridge (R0577), 9 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 1 larva 11 June 2003. Graney River, Caher Bridge south of Lough Graney (R5590), 1 larva 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Glenveagh National Park (C0019), 1♀ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest along a river, M. C. D. Speight. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 2 larvae 10 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 3 larvae 7 November 2002. Duniry River, south-west of Duniry (M7209), 9 larvae 7 November 2002. Owendalulleegh River, ford at Inchamore (R5699), 1 larva 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 3 larvae 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 3 larvae 17 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 7 larvae 5 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Agapetus ochripes* Curtis, 1834 (Fig. 6)**

DUBLIN: Dublin Zoo (O1235), 2♀♀ 11 September-11 October 2019, Rothamsted Insect Survey light-trap per A. Riley.
GALWAY: Duniry River, south-west of Duniry (M7209), 2 larvae 7 November 2002. Owendalulleegh River, ford at Inchamore (R5699), 6 larvae 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

KERRY: Finow River, downstream of Lough Guitane (W0185), 2 larvae 12 March 2003. Owenreagh River, bridge upstream of the Upper Lake (V8882), 1 larva 19 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

MAYO: Ballycroy National Park (F8607), 1♂ 30 May-20 June 1997, Malaise trap on unimproved, non-calcareous, humid and oligotrophic montane grassland along the Owenduff River, M. C. D. Speight.

Previously only known in County Mayo from the Robe River (M1964) at Ballinrobe.

***Glossosoma boltoni* Curtis, 1834 (Fig. 7)**

CLARE: Broadford River, near Scotts Bridge (R6172), 3 larvae 5 March 2003. Glendine River, Knockloskeraun Bridge (R0577), 3 larvae 23 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 1 larva 5 June 2003. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 2 larvae 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 19 larvae 11 February 2003. Eanymore Water, bridge south-west of Letterbarra (G8882), 2 larvae 12 February 2003. Gweebarra River, Pollglass Bridge (B9413), 1 larva 15 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Rosroe [Barrna-nOra] (L7541), 1♀ 28 April-19 May 1994, 2♀♀ 29 July-10 August 1994 & 3♀♀ 21 September-7 October 1994, Malaise traps at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

KILDARE: River Liffey, Castletown Estate, Celbridge (N9733), 1♂ 25 September 2019 & 1♂ 20 October 2019, J. P. O'Connor & M. A. O'Connor.

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 9 larvae 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

Glossosoma boltoni was only previously known from the River Maigue (R5327) in County Limerick.

MAYO: Clydagh River, near Burren (M1496), 1 larva 19 February 2003, collected & determined C. Bradley (Kelly-Quinn et al., 2019).

SLIGO: Dunneill River, near Dromore West (G4334), 1 larva 17 October 2002. Gowlan River, upstream of the confluence with the Easky River (G3826), 5 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 2 larvae 30 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 1 larva 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 6 larvae 19 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Glossosoma conformis* Neboiss, 1963 New to Counties Donegal and Kerry (Fig. 8)**

DONEGAL: Glenveagh National Park (C0019), 1♂3♀♀ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest along a river, M. C. D. Speight.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♀ 1-21 July 1995, Malaise trap on moor, *Ulex* thickets and unimproved montane non-calcareous grassland with a stream in a gully, M. C. D. Speight.

MAYO: Ballycroy National Park (F8607), 1♀ 30 May-20 June 1997, Malaise trap on unimproved, non-calcareous, humid and oligotrophic montane grassland along the Owenduff River, M. C. D. Speight.

Previously only known in County County Mayo from the Owengarve River (F9101).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 1 larva 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

Previously only known in County Wexford from the Maudlins Stream near New Ross (S7328).

HYDROPTILIDAE

***Hydroptila angulata* Mosely, 1922**

DONEGAL: Glenveagh National Park (C0221), 2♂♂ 10-30 July 1998, Malaise trap on blanket bog and cutover blanket bog with pools, M. C. D. Speight.

This is the second record for County Donegal.

***Hydroptila cornuta* Mosley, 1922 New to County Mayo (Fig. 9)**

MAYO: Ballycroy (Mayo) National Park (F8607), 1♀ 30 May-20 June 1997, Malaise trap on cutover blanket bog along a river, M. C. D. Speight.

***Hydroptila forcipata* (Eaton, 1873) (Fig. 10)**

GALWAY: Owenriff River, Oughterard (M1142), 16♀♀ 23 August 2015, 15W Actinic light-trap, M. P. Gammell. Rosroe [Barrna-nOra] (L7541), 64♂♂48♀♀29 July-10 August 1994 & 37♂♂7♀♀ 21 September-7 October 1994, Malaise traps at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

MAYO: Ballycroy (Mayo) National Park (F8607), 18♂♂6♀♀ 30 May-20 June 1997 & 3♂♂ 1-20 July 1997, Malaise traps on an open grassy trackside within a *Pinus* planatation beside the Gennamong River which flows through bogland, M. C. D. Speight.

***Hydroptila lotensis* Mosely, 1930 New to Counties Dublin and Waterford (Fig. 11)**

DUBLIN: Dublin Zoo (O1235), 1♂2♀♀ 9-22 August 2019 & 1♂7♀♀ 23 August-10 September 2019, Rothamsted Insect Survey light-trap per A. Riley.

WATERFORD: Belle Lake (S6605), 1♀ 1 July 2019, light-trap at the pump house beside the lake, A. Walshe.

The Waterford record was included in Addendum 3.

***Hydroptila simulans* Mosely, 1920 (Fig. 12)**

MAYO: Ballycroy (Mayo) National Park (F8607), 4♂♂ 30 May-20 June 1997 & 5♂♂2♀♀ 1-20 July 1997, Malaise traps on an open grassy trackside within a *Pinus* planatation beside the Gennamong River which flows through bogland, M. C. D. Speight.

***Hydroptila sparsa* Mosely, 1920 (Fig. 13)**

GALWAY: Rosroe [Barrna-nOra] (L7541), 1♀ 29 July-10 August 1994, Malaise trap at a *Picea/Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

***Hydroptila tineoides* Dalman, 1819 (Fig. 14)**

DONEGAL: Glenveagh National Park (C0019), 1♂ 10-30 June 1998 & 1♂ 10-30 July 1998, Malaise traps in acidophilous *Quercus* forest along a river, M. C. D. Speight.

GALWAY: Rosroe [Barrna-nOra] (L7541), 2♂♂ 28 April-19 May 1994, 3♂♂1♀ 29 July-10 August 1994 & 10♂♂1♀ 21 September-7 October 1994, Malaise traps at a *Picea/Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

MAYO: Ballycroy (Mayo) National Park (F9403), 10♂♂4♀♀ 30 May-20 June 1997, 1♂ 1-20 July 1997 & 1♂ 1-20 August 1997, Malaise traps on open, grassy trackside within a *Pinus* plantation beside the Gennamong River which flows through bogland, M. C. D. Speight.

***Hydroptila vectis* Curtis, 1834 New to County Galway (Fig. 15)**

DUBLIN: Dublin Zoo (O1235), 1♂ 9-22 August 2019, Rothamsted Insect Survey light-trap per A. Riley.

The species was previously recorded in County Dublin from the River Dodder (O1328).

GALWAY: Rosroe [Barrna-nOra] (L7541), 31♂♂7♀♀ 29 July-10 August 1994, Malaise trap at a *Picea/Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

***Ithytrichia lamellaris* Eaton, 1873**

GALWAY: Owenriff River, Oughterard (M1142), 1♂1♀ 23 August 2015, 15W Actinic light-trap, M. P. Gammell.

***Oxyethira falcata* Morton, 1893 (Fig. 16) New to County Waterford**

GALWAY: Rosroe [Barrna-nOra] (L7541), 1♂ 29 July-10 August 1994 & 3♀♀ 21 September-7 October 1994, Malaise traps at a *Picea/Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

WATERFORD: Tramore (S5701), 1♀ 11 September 2019, 125w MV Robinson, T. Bryant.

This is the first record of *Oxyethira falcata* for south-east Ireland.

***Oxyethira flavicornis* (Pictet, 1834) (Fig. 17)**

DONEGAL: Glenveagh National Park (C0120), 3♂♂ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest beside Lough Veagh, (C0018), 3♂♂2♀♀ 10-30 June 1998 & 1♂ 10-30 July 1998, Malaise traps on humid non-calcareous (*Molinia*) oligotrophic and montane unimproved grassland along a river, 1♂ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest along a river and 1♂ 10-30 July 1998, Malaise trap on blanket bog and cutover bog, M. C. D. Speight.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♀ 1-21 June 1995, Malaise trap on unimproved oligotrophic, montane non-calcareous grassland and montane improved grassland near the Owengariff River, M. C. D. Speight.

***Oxyethira frici* Klapálek, 1891**

MAYO: Ballycroy (Mayo) National Park (F8607), 3♂♂ 30 May-20 June 1997, 1♂2♀♀ 1-20 July 1997 & 14♂♂6♀♀ 1-20 August 1997, Malaise traps on an open grassy trackside within a *Pinus* planatation. M. C. D. Speight.

***Oxyethira mirabilis* Morton, 1904 New to County Donegal. Second and third Irish records**

DONEGAL: Glenveagh National Park (C0018), 1♂ 10-30 June 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic and montane unimproved grassland along a river, M. C. D. Speight.

MAYO: Ballycroy (Mayo) National Park (F9403), 1♂ 1-20 August 1997, Malaise trap on an open grassy trackside within a *Pinus* planatation beside the Gennamong River which flows through bogland, (F8607), 4♀♀ 1-20 July 1997, Malaise trap on cutover blanket bog near the River Owenduff , M. C. D. Speight.

The above males are the first known Irish ones. An additional four females were taken in a Malaise trap in the same grid square (F8607) where the first two Irish females were discovered. However, these were trapped in July, a new month for the species in Ireland.

***Oxyethira sagittifera* Ris, 1897**

DONEGAL: Glenveagh National Park (C0018), 4♀♀ 10-30 June 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane and unimproved grassland along a river, M. C. D. Speight.

***Oxyethira simplex* Ris, 1897 New to County Donegal**

DONEGAL: Glenveagh National Park (C0018), 3♂♂ 10-30 July 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane unimproved grassland along a river, M. C. D. Speight.

KERRY: Old Kenmare Road, Killarney National Park (V9582), ♀♀ 1- 21 June 1995, Malaise trap on unimproved oligotrophic, montane non-calcareous grassland and montane improved grassland near the Owengariff River, M. C. D. Speight.

PHILOPOTAMIDAE

***Chimarra marginata* (Linnaeus, 1761) (Fig. 22)**

KERRY: Owenreagh River, bridge upstream of the Upper Lake (V8882), 7 larvae 19 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Philopotamus montanus* (Donovan, 1813) New to County Leitrim (Fig. 23)**

ANTRIM: Glendun Farm, Glendun River (D2031), adult 17 May 2018, collected & determined R. Mitchell (NBN, 2020). Quolie Reservoir (D1813), 1♂1♀ 18 September 2019, C. McNaughton.

CAVAN: Swanlinbar River, Commas Bridge (H1424), 2 larvae 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 2 larvae 24 October 2002. Broadford River, near Scotts Bridge (R6172), 21 larvae 24 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 2 larvae 24 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 10 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Glenveagh National Park (C0019), 5♂♂1♀ 10-30 June 1998, 6♂♂ 10-30 July 1998 & 20♂♂♀ 12 August-2 September 1998, Malaise traps in acidophilous *Quercus* forest along a river, M. C. D. Speight. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 184 larvae 14 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DOWN: Stormont Estate, Belfast (J4074), adult 12 April 2018, on a wall near a stony fast flowing steam, collected & determined P. McCullough (NBN, 2020).

DUBLIN: River Dodder, upstream of the reservoir (O1120), 1 larva 28 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Shanganagh River, Kilternan (O2021), 1♂ 23 September 2019, collected & determined J. T. Brophy.

GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Rosroe [Barrna-nOra] (L7541), 1♂ 28 April-19 May 1994 & 1♀ 29 July-10 August 1994, Malaise traps at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

KERRY: Coomcallee, Carrauntoohil (V8084), 1♀ 22 June 2019, collected & determined J. T. Brophy; Finow River, downstream of Lough Guitane (W0185), 25 larvae 20 November 2002. Owenmore River, bridge at Boherboy (Q5110), 12 larvae 19 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 1 larva 19 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 48 larvae 16 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
LIMERICK: Funshion River, Brackbaun Bridge (R8816), 14 larvae 8 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Clydagh River, near Burren (M1496), 1 larva 31 October 2002. Keerglen River, bridge north-east of Doondragon (G0933), 14 larvae 1 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 5 larvae 19 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Glenealo River upstream of the Upper Lake, Glendalough (T0896), 1 larva 28 November 2002. Little Slaney, ford south of Coan (S9891), 26 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Wormaldia occipitalis* (Pictet, 1834) New to Counties Galway and Limerick (Fig. 24)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 2 larvae 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CLARE: Bow River, Bow River Bridge (R6687), 1 larva 24 October 2002. Bridge on river near Spancelhill (R3880), 2 larvae 4 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Glenveagh National Park (C0019), 1♀ 12 August-2 September 1998, Malaise trap in a mature acidophilous *Quercus* forest along a river, M. C. D. Speight.
GALWAY: Owenglin River, bridge south-west of Clifden Lodge (L6750), 2 larvae 20 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♂ 1-21 August 1995, Malaise trap on a moor with *Ulex* thickets, unimproved oligotrophic montane, non-calcareous grassland and a stream in a gully, 1♀ 1-21 August 1995, Malaise trap on cutover blanket bog and moor with springs, M. C. D. Speight. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 9 larvae 25 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
LIMERICK: Funshion River, Brackbaun Bridge (R8816), 5 larvae 25 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 3 larvae 23 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Little Slaney, ford south of Coan (S9891), 2 larvae 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Wormaldia subnigra* McLachlan, 1865**

GALWAY: Owenriff River, Oughterard (M1142), 8♂♂1♀ 23 August 2015, 15W Actinic light-trap, M. P. Gammell.

POLYCENTROPODIDAE

***Cyrnus trimaculatus* (Curtis, 1834) (Fig. 25)**

CLARE: Glendine River, Knockloskeraun Bridge (R0577), 1 larva 4 March 2003. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 4 larvae 11 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 15 October 2002. Eanymore Water, Eanymore Bridge (G8481), 1 larva 5 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 2 larvae 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Duniry River, south-west of Duniry (M7209), 1 larva 12 June 2003. Owendalulleegh River, ford at Inchamore (R5699), 6 larvae 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KERRY: Old Kenmare Road, Killarney National Park (V9582), 2♂♂4♀♀ 1-21 August 1995, Malaise trap on a moor with *Ulex* thickets, unimproved oligotrophic montane, non-calcareous grassland and a stream in a gully, M. C. D. Speight. Owenreagh River, bridge upstream of the Upper Lake (V8882), 1 larva 24 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

MAYO: Clydagh River, near Burren (M1496), 1 larva 10 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

SLIGO: Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 1 larva 9 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Holocentropus dubius* (Rambur, 1842) (Fig. 26)**

GALWAY: Connemara National Park (L7156), 2♀♀ 8-26 June 1994, Malaise trap on montane, unimproved, humid and non-calcareous grassland with a stream, M. C. D. Speight.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♀ 1-21 June 1995, Malaise trap on cutover blanket bog and moor with spring, M. C. D. Speight.

***Holocentropus picicornis* (Stephens, 1836) (Fig. 27)**

DONEGAL: Tory Island (B8745), 9 larvae 11 June 2016, sweep/kick sample, 1 ♀ 11 June 2016, hand net, collected & determined M. P. Gammell & C. M. Carlin.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♀ 1-21 August 1995, Malaise trap on a moor with *Ulex* thickets, unimproved oligotrophic montane, non-calcareous grassland and a stream in a gully, M. C. D. Speight.

***Neureclipsis bimaculata* (Linnaeus, 1758)**

KERRY: Finow River, downstream of Lough Guitane (W0185), 2 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Plectrocnemia conspersa* (Curtis, 1834) New to County Leitrim (Fig. 28)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 1 larva 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 11 larvae 5 March 2003. Broadford River, near Scotts Bridge (R6172), 10 larvae 24 October 2002. Glendine River, Knockloskeraun Bridge (R0577), 5 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 3 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 14 larvae 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 2 larvae 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 3 larvae 5 June 2003. Eanymore Water, bridge south-west of Letterbarra (G8882), 4 larvae 5 June 2003, All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Glenveagh National Park (C0019), 1♀ 10-30 June 1998, 1♀ 10-30 July 1998 & 1♂ 12 August-2 September 1998, Malaise traps in acidophilous *Quercus* forest along a river, M. C. D. Speight. River Gweebarra River, Pollglass Bridge (B9413), 7 larvae 15 October 2002. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 1 larva 14 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DOWN: Hillsborough Estate (J2457), 1♂ 15-26 August 2019 , Rothamsted Insect Survey light-trap per A. Riley.

DUBLIN: River Dodder, upstream of the reservoir (O1120), 4 larvae 28 November 2002. River Liffey, downstream of Ballyward Bridge (O0216), 1 larva 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 2 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Connemara National Park (L7156), 3♂♂1♀ 8-26 June 1994, Malaise trap on montane, unimproved, humid and non-calcareous grassland with a stream, M. C. D. Speight. Owenglin River, bridge south-west of Clifden Lodge (L6750), 1 larva 20 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Rosroe [Barrna-nOra] (L7541), 1♂ 28 April-19 May 1994, 7♂♂1♀ 29 July-10 August 1994 & 8♂♂3♀♀ 21 September-7 October 1994, Malaise traps at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♂4♀♀ 1-21 July 1995 & 2♀♀ 1-21 August 1995, Malaise traps on cutover blanket bog and moor with spring, 1♀ 1-21 June 1995, Malaise trap on unimproved oligotrophic, montane non-calcareous grassland and montane improved grassland near the Owengariff River, M. C. D. Speight. Owenmore River, bridge at Boherboy (Q5110), 1 larva 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 1 larva 12 March 2003. River Flesk, bridge near Glenflesk (W0685), 1 larva 13 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 7 larvae 16 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Ballycroy National Park (F9403), 1♂1♀ 30 May-20 June 1997, Malaise trap on open, grassy trackside within a *Pinus* plantation beside the Glennamong River, M. C. D. Speight. Clydagh River, near Burren (M1496), 5 larvae 31 October 2002. Cregganlar River [Behy], bridge south-west of Bunnyconnellan (G3217), 3 larvae 14 February 2003. Keerglen River, bridge north-east of Doondragon (G0933), 1 larva 18 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 2 larvae 10 June 2003. Dunneill River, near Dromore West (G4334), 2 larvae 10 June 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 27 larvae 4 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 1 larva 9 June 2003. River Moy, bridge south-east of Cloonacool (G4916), 6 larvae 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 3 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 1 larva 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 2 larvae 28 November 2002. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 4 larvae 28 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
***Plectrocnemia geniculata* McLachlan, 1871 New to County Cavan (Fig. 29)**
CAVAN: Swanlinbar River, Commas Bridge (H1424), 1 larva 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CLARE: Graney River, Caher Bridge south of Lough Graney (R5590), 1 larva 12 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CORK: Glengarriff River, bridge west of Skehil (V8958), 3 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Glenveagh National Park (C0019), 1♀ 10-30 June 1998 & 3♂♂2♀♀ 10-30 July 1998, Malaise traps in acidophilous *Quercus* forest along a river, M. C. D. Speight. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 1 larva 14 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DUBLIN: River Dodder, upstream of the reservoir (O1120), 6 larvae 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
GALWAY: Rosroe [Barrna-nOra] (L7541), 3♂♂ 29 July-10 August 1994, Malaise trap at a *Picea/Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.
SLIGO: Owengarve River, ford north-west of Srah Upper (G5503), 1 larva 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Glenealo River upstream of the Upper Lake, Glendalough (T0896), 5 larvae 28 November 2002. Little Slaney, ford south of Coan (S9891), 6 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Polycentropus flavomaculatus* (Pictet, 1834) (Fig. 30)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 7 larvae 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CLARE: bridge on river near Spancelhill (R3880), 1 larva 4 March 2003. Broadford River, near Scotts Bridge (R6172), 3 larvae 11 June 2003. Glendine River, Knockloskeraun Bridge (R0577), 6 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 8 larvae 4 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CORK: Sullane River, Linnamilla Bridge (W3172), 17 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 10 larvae 15 October 2002. Gweebarra River, Pollglass Bridge (B9413), 53 larvae 15 October 2002. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 1 larva 14 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DUBLIN: River Dodder, upstream of the reservoir (O1120), 6 larvae 3 June 2003. River Liffey, downstream of Ballyward Bridge (O0216), 7 larvae 7 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). River Liffey, Ballynabrocky (O0913), 1♂ 5 July 2019, collected & determined J. T. Brophy.
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 14 larvae 7 November 2002. Duniry River, south-west of Duniry (M7209), 25 larvae 7 November 2002. Owendalulleegh River, ford at Inchamore (R5699), 25 larvae 7 November 2002. Owenglin River, bridge south-west of Clifden Lodge (L6750), 1 larva 20 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

KERRY: Finow River, downstream of Lough Guitane (W0185), 8 larvae 20 November 2002. Owenmore River, bridge at Boherboy (Q5110), 6 larvae 19 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 1 larva 12 March 2003. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 2 larvae 19 November 2002. River Flesk, bridge near Glenflesk (W0685), 2 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: River Bilboa, north-west of Doon (R8151), 11 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Clydagh River, near Burren (M1496), 8 larvae 31 October 2002. Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 21 larvae 18 October 2002. Keerglen River, bridge north-east of Doondragon (G0933), 2 larvae 1 November 2002. River Moy, at Bleanmore (G2600), 20 larvae 6 October 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 5 larvae 17 October 2002. Dunneill River, near Dromore West (G4334), 5 larvae 13 February 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 18 larvae 4 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 7 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 63 larvae 10 June 2003. River Moy, bridge south-east of Cloonacool (G4916), 13 larvae 17 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

TIPPERARY: Nenagh River, Nenagh (R8780), 1♂ 12 September 2019, collected & determined J. T. Brophy. Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 13 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 9 larvae 19 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 7 larvae 25 February 2003. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 36 larvae 28 November 2002. Little Slaney, ford south of Coan (S9891), 5 larvae 29 November 2002. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 3 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Polycentropus irroratus* (Curtis, 1835) (Fig. 31)**

CLARE: Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 1 larva 11 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Glenveagh National Park (C0019), 1♂ 12 August-2 September 1998, Malaise trap in a mature acidophilous *Quercus* forest along a river, M. C. D. Speight.

KERRY: Finow River, downstream of Lough Guitane (W0185), 2 larvae 12 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan (G3217), 1 larva 14 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Polycentropus kingi* McLachlan, 1881 (Fig. 32)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 3 larvae 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CLARE: Glendine River, Knockloskeraun Bridge (R0577), 1 larva 11 June 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CORK: Glengarriff River, bridge west of Skehil (V8958), 3 larvae 25 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 7 larvae 5 June 2003. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 5 June 2003. Eanymore Water, Eanymore Bridge (G8481), 2 larvae 5 June 2003. Gweebarra River, Pollglass Bridge (B9413), 4 larvae 5 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 4 larvae 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 2 larvae 12 June 2003. Duniry River, south-west of Duniry (M7209), 1 larva 12 June 2003. Owendalulleegh River, ford at Inchamore (R5699), 1 larva 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Rosroe [Barrna-nOra] (L7541), 15♂♂ 29 July-10 August 1994 & 8♂♂ 21 September-7 October 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.
KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♂ 1-21 August 1995, Malaise trap on a moor with *Ulex* thickets, unimproved oligotrophic montane, non-calcareous grassland and a stream in a gully, M. C. D. Speight. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 4 larvae 25 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan (G3217), 2 larvae 9 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 1 larva 17 October 2002. Gowlan River, upstream of the confluence with the Easky River (G3826), 10 larvae 19 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 1 larva 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 7 larvae 27 June 2003. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 1 larva 3 July 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

PSYCHOMYIIDAE

***Lype reducta* (Hagen, 1868)**

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♀ 1-21 August 1995, Malaise trap on cutover blanket bog and moor, M. C. D. Speight.

***Psychomyia pusilla* (Fabricius, 1781) (Fig. 33)**

CLARE: Bow River, Bow River Bridge (R6687), 5 larvae 11 June 2003. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 9 larvae 11 June 2003. Graney River, Caher Bridge south of Lough Graney (R5590), 2 larvae 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 1 larva 5 June 2003. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 15 October 2002. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 8 larvae 4 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 10 larvae 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 4 larvae 12 June 2003. Owendalulleegh River, ford at Inchamore (R5699), 2 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Rosroe [Barrna-nOra] (L7541), 40♂♂2♀♀ 29 July-10 August 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

KERRY: Finow River, downstream of Lough Guitane (W0185), 2 larvae 24 June 2003. Owenmore River, bridge at Boherboy (Q5110), 19 larvae 11 March 2003. Owenreagh River, bridge upstream of the Upper Lake (V8882), 2 larvae 24 June 2003. River Flesk, bridge near Glenflesk (W0685), 4 larvae 24 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: River Bilboa, north-west of Doon (R8151), 5 larvae 23 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Ballycroy National Park (F9403), 1♂ 30 May-20 June 1997, Malaise trap on open, grassy trackside within a *Pinus* plantation beside the Glennamong River, M. C. D. Speight. Clydagh River, near Burren (M1496), 1 larva 31 October 2002. Cregganlar River [Behy], bridge south-west of Bunnyconnellan (G3217), 2 larvae 9 June 2003. River Moy, at Bleanmore

(G2600), 4 larvae 19 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 2 larvae 10 June 2003. Dunneill River, near Dromore West (G4334), 12 larvae 10 June 2003. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 3 larvae 17 October 2002. Owengarve River, ford north-west of Srah Upper (G5503), 1 larva 30 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 2 larvae 9 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 1 larva 5 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: River Slaney, Waterloo Bridge (S9093), 1 larva 3 July 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Tinodes maculicornis* (Pictet, 1834) New to County Sligo (Fig. 34)**

CLARE: Graney River, Caher Bridge south of Lough Graney (R5590), 1 larva 24 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 2 larvae 10 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Tinodes waeneri* (Linnaeus, 1758) (Fig. 35)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 20 May 2019, in a MV light-trap, collected & determined R. Monteith (NBN, 2020).

CLARE: Inis Cealtra, Lough Derg (R6984), 1♂ 24 October 2019, collected & determined J. T. Brophy.

DONEGAL: Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 2 larvae 5 June 2003. Eanymore Water, Eanymore Bridge (G8481), 3 larvae 5 June 2003. Gweebarra River, Pollglass Bridge (B9413), 1 larva 5 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DUBLIN: River Dodder, upstream of the reservoir (O1120), 2 larvae 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). River Liffey, Ballynabrocky (O0913), 1♂ 5 July 2019, collected & determined J. T. Brophy.

GALWAY: Owendalulleegh River, ford at Inchamore (R5699), 1 larva 12 June 2003. Owenglin River, bridge south-west of Clifden Lodge (L6750), 1 larva 20 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Rosroe [Barrna-nOra] (L7541), 3♂♂10♀♀ 29 July-10 August 1994 & 1♀ 21 September-7 October 1994, Malaise trap at a *Picea*/*Pinus* plantation on cutover blanket bog/moor and a river, M. C. D. Speight.

KERRY: Finow River, downstream of Lough Guitane (W0185), 1 larva 24 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Old Kenmare Road, Killarney

National Park (V9582), 1♂ 1-21 July 1995, Malaise trap on cutover blanket bog and moor with spring, M. C. D. Speight.
MAYO: Clydagh River, near Burren (M1496), 1 larva 31 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Glenealo River upstream of the Upper Lake, Glendalough (T0896), 2 larvae 3 July 2003. Little Slaney, ford south of Coan (S9891), 1 larva 27 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

HYDROPSYCHIDAE

***Cheumatopsyche lepida* (Pictet, 1834) (Fig. 36)**
GALWAY: Rosroe [Barrna-nOra] (L7541), 1♀ 29 July-10 August 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.
KERRY: Finow River, downstream of Lough Guitane (W0185), 75 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: River Moy, at Bleanmore (G2600), 131 larvae 6 October 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
***Diplectrona felix* McLachlan, 1878 New to County Leitrim (Fig. 37)**
CLARE: Broadford River, near Scotts Bridge (R6172), 23 larvae 5 March 2003. Graney River, Caher Bridge south of Lough Graney (R5590), 11 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Glenveagh National Park (C0019), 1♂ 10-30 June 1998, Malaise trap in *Betula*/acidophilous *Quercus* forest with tall-herb open areas along a river, (C0018), 1♂ 10-30 July 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane unimproved grassland along a river, M. C. D. Speight.
LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 1 larva 16 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 3 larvae 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
***Hydropsyche angustipennis* (Curtis, 1834) New to County Clare (Fig. 38)**
CLARE: Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 1 larva 11 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: River Moy, at Bleanmore (G2600), 5 larvae 6 October 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
***Hydropsyche contubernalis* McLachlan, 1865 (Fig. 39)**
MAYO: River Moy, at Bleanmore (G2600), 14 larvae 19 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Hydropsyche instabilis* (Curtis, 1834) New to Counties Clare, Galway, Limerick and Sligo (Fig. 40)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 1 larva 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Broadford River, near Scotts Bridge (R6172), 7 larvae 11 June 2003. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 3 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 83 larvae 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Owenglin River, bridge south-west of Clifden Lodge (L6750), 1 larva 7 October 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 1 larva 5 June 2003, collected & determined C. Bradley (Kelly-Quinn et al., 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 4 larvae 25 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan (G3217), 36 larvae 9 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 26 larvae 10 June 2003. Dunneill River, near Dromore West (G4334), 4 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 1 larva 30 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 2 larvae 9 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 6 larvae 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Hydropsyche pellucidula* (Curtis, 1834) New to County Sligo (Fig. 41)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 1 larva 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 15 larvae 24 October 2002. Broadford River, near Scotts Bridge (R6172), 46 larvae 24 October 2002. Glendine River, Knockloskeraun Bridge (R0577), 36 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 31 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 141 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 4 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 75 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 54 larvae 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 31 larvae 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 250 larvae 15 October 2002. Eanymore Water, bridge south-west of Letterbarra (G8882), 29 larvae 16 October 2002. Gweebarra River, Pollglass Bridge (B9413), 5 larvae 15 October 2002.
River Ballyhallan, bridge upstream of the Clonmany River (C3646), 85 larvae 14 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019.
DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 5 larvae 29 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 3 larvae 7 November 2002. Duniry River, south-west of Duniry (M7209), 13 larvae 7 November 2002. Owendalulleegh River, ford at Inchamore (R5699), 150 larvae 7 November 2002. Owenglin River, bridge south-west of Clifden Lodge (L6750), 7 larvae 7 October 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
KERRY: Finow River, downstream of Lough Guitane (W0185), 445 larvae 20 November 2002. Owenmore River, bridge at Boherboy (Q5110), 1 larva 19 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 20 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 3 larvae 12 March 2003. River Flesk, bridge near Glenflesk (W0685), 16 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
LIMERICK: Funshion River, Brackbaun Bridge (R8816), 18 larvae 8 November 2002. River Bilboa, north-west of Doon (R8151), 125 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan (G3217), 10 larvae 9 June 2003. Keerglen River, bridge north-east of Doondragon (G0933), 5 larvae 18 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 23 larvae 13 February 2003. Dunneill River, near Dromore West (G4334), 4 larvae 13 February 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 41 larvae 4 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 4 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 54 larvae 30 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 1 larva 17 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 19 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 4 larvae 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 1 larva 25 February 2003. Little Slaney, ford south of Coan (S9891), 3 larvae 29 November 2002. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 12 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 2 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Hydropsyche siltalai* Döhler, 1963 New to County Sligo (Fig. 42)**

CAVAN: Swanlinbar River, Commas Bridge (H1424), 77 larvae 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 9 larvae 24 October 2002. Bridge on river near Spancelhill (R3880), 139 larvae 23 October 2002. Glendine River, Knockloskeraun Bridge (R0577), 307 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 75 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 11 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 25 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 187 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 71 larvae 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 51 larvae 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 375 larvae 15 October 2002. Eanymore Water, bridge south-west of Letterbarra (G8882), 42 larvae 16 October 2002. Gweebarra River, Pollglass Bridge (B9413), 32 larvae 15 October 2002. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 211 larvae 14 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DUBLIN: River Dodder, upstream of the reservoir (O1120), 23 larvae 28 November 2002. River Liffey, downstream of Ballyward Bridge (O0216), 26 larvae 7 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 82 larvae 7 November 2002. Duniry River, south-west of Duniry (M7209), 27 larvae 7 November 2002. Owenglin River, bridge south-west of Clifden Lodge (L6750), 20 larvae 20 February 2003. Owendalulleegh River, ford at Inchamore (R5699), 607 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Owenriff River, Oughterard (M1142), 1♂ 23 August 2015, 15W Actinic light-trap, M. P. Gammell.

KERRY: Finow River, downstream of Lough Guitane (W0185), 581 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Old Kenmare Road, Killarney National Park (V9582), 3♂♂4♀♀ 1-21 July 1995 & 1♀ 1-21 August 1995, Malaise traps on moor, *Ulex* thickets and unimproved montane non-calcareous grassland with a stream

in a gully, M. C. D. Speight. Owenmore River, bridge at Boherboy (Q5110), 149 larvae 19 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 32 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 14 larvae 19 November 2002. River Flesk, bridge near Glenflesk (W0685), 34 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: River Bilboa, north-west of Doon (R8151), 425 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Ballycroy (Mayo) National Park (F9403), 1♀ 1-20 August 1997, Malaise trap on open, grassy trackside within a *Pinus* plantation beside the Gennamong River which flows through bogland, M. C. D. Speight. Clydagh River, near Burren (M1496), 71 larvae 19 February 2003. Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 33 larvae 14 February 2003. Keerglen River, bridge north-east of Doondragon (G0933), 85 larvae 18 February 2003. River Moy, at Bleanmore (G2600), 87 larvae 6 October 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 37 larvae 13 February 2003. Dunneill River, near Dromore West (G4334), 274 larvae 17 October 2002. Gowlan River, upstream of the confluence with the Easky River (G3826), 119 larvae 4 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 42 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 129 larvae 10 June 2003. River Moy, bridge south-east of Cloonacool (G4916), 133 larvae 17 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 56 larvae 5 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 112 larvae 19 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 39 larvae 25 February 2003. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 10 larvae 28 November 2002. Little Slaney, ford south of Coan (S9891), 15 larvae 27 June 2003. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 33 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 16 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

PHRYGANEIDAE

***Agrypnia varia* (Fabricius, 1793) (Fig. 43)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 25 August 2015, moth trap, collected & determined R. Monteith (NBN, 2020).

DONEGAL: Glenveagh National Park (C0018), 1♂ 10-30 June 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane and unimproved grassland along a river, M. C. D. Speight. Tory Island (B8745), 1 larva 11 June 2016, sweep/kick sample, (B8546), 1♀ 11 June 2016, light-trap 15w Actinic, collected & determined M. P. Gammell & C. M. Carlin.

***Phryganea bipunctata* Retzius, 1783**

DONEGAL: Glenveagh National Park (C0221), 1♀ 10-30 July 1998, Malaise trap on blanket bog and cutover blanket bog with pools, M. C. D. Speight.

***Phryganea grandis* Linnaeus, 1758 New to County Derry (Londonderry) (Fig. 44)**

DERRY (LONDONDERRY): Springwell Forest (also bogland with pools) (C7626), adult 29 June 2019, moth trap, collected T. Edwards & determined S. Flint (NBN, 2020).

GOERIDAE

***Goera pilosa* (Fabricius, 1775) (Fig. 45)**

CORK: Sullane River, Linnamilla Bridge (W3172), 5 larvae 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 4 larvae 15 October 2002. Eanymore Water, bridge south-west of Letterbarra (G8882), 5 larvae 16 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 1 larva 29 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Duniry River, south-west of Duniry (M7209), 4 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KERRY: Owenreagh River, bridge upstream of the Upper Lake (V8882), 4 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 6 larvae 19 November 2002. River Flesk, bridge near Glenflesk (W0685), 5 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

MAYO: River Moy, at Bleanmore (G2600), 9 larvae 19 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

SLIGO: Owengarve River, ford north-west of Srah Upper (G5503), 11 larvae 30 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TYRONE: Cottage Farm BioBlitz, River Strule, Tattynure (H4380), adult 15 August 2015, collected CEDaR staff & determined A. Niven (NBN, 2020).

***Silo nigricornis* (Pictet, 1834) New to County Sligo (Fig. 46)**

CLARE: bridge on river near Spancelhill (R3880), 10 larvae 23 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 5 larvae 29 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 3 larvae 13 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
***Silo pallipes* (Fabricius, 1781) New to Counties Galway, Leitrim and Limerick (Fig. 47)**
CAVAN: Swanlinbar River, Commas Bridge (H1424), 3 larvae 17 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
CLARE: Bow River, Bow River Bridge (R6687), 10 larvae 5 March 2003. Bridge on river near Spancelhill (R3880), 2 larvae 4 March 2003. Broadford River, near Scotts Bridge (R6172), 6 larvae 24 October 2002. Glendine River, Knockloskeraun Bridge (R0577), 40 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 6 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 87 larvae 24 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
CORK: Glengarriff River, bridge west of Skehil (V8958), 11 larvae 12 March 2003. Sullane River, Linnamilla Bridge (W3172), 1 larva 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 1 larva 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 3 larvae 15 October 2002. Eanymore Water, bridge south-west of Letterbarra (G8882), 4 larvae 16 October 2002. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 54 larvae 10 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019.
DUBLIN: River Dodder, upstream of the reservoir (O1120), 36 larvae 28 November 2002. River Liffey, downstream of Ballyward Bridge (O0216), 7 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 20 larvae 7 November 2002. Duniry River, south-west of Duniry (M7209), 51 larvae 3 March 2003. Owendalulleegh River, ford at Inchamore (R5699), 30 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Rosroe [Barrna-nOra] (L7541), 26♂♂2♀♀ 29 July-10 August 1994 & 3♂♂ 21 September-7 October 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.
KERRY: Finow River, downstream of Lough Guitane (W0185), 90 larvae 2 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Old Kenmare Road, Killarney National Park (V9582), 3♂♂ 1-21 July 1995, Malaise trap on moor, *Ulex* thickets and unimproved montane non-calcareous grassland with a stream in a gully, 2♂♂ 1-21 June 1995,

Malaise trap on unimproved oligotrophic, montane non-calcareous grassland and montane improved grassland near the Owengariff River, M. C. D. Speight. Owenmore River, bridge at Boherboy (Q5110), 16 larvae 19 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 5 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 3 larvae 19 November 2002. River Flesk, bridge near Glenflesk (W0685), 10 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 3 larvae 12 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 60 larvae 8 November 2002. River Bilboa, north-west of Doon (R8151), 21 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Ballycroy (Mayo) National Park (F8607), 2♂♂1♀ 30 May-20 June 1997, Malaise trap on cutover blanket bog along a river, 30♂♂11♀♀ 1-20 August 1997, Malaise trap on an open grassy trackside within a *Pinus* planatation beside the Gennamong River which flows through bogland, M. C. D. Speight. Clydagh River, near Burren (M1496), 15 larvae 31 October 2002. Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 11 larvae 14 February 2003. Keerglen River, bridge north-east of Doondragon (G0933), 3 larvae 18 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 8 larvae 17 October 2002. Dunneill River, near Dromore West (G4334), 25 larvae 17 October 2002. Gowlan River, upstream of the confluence with the Easky River (G3826), 5 larvae 13 February 2003. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 25 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 48 larvae 30 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 7 larvae 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 66 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 47 larvae 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 30 larvae 28 November 2002. Little Slaney, ford south of Coan (S9891), 1 larva 29 November 2002. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 90 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 28 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LEPIDOSTOMATIDAE

***Crunoecia irrorata* (Curtis, 1834) New to County Down (Fig. 48)**

CLARE: Broadford River, near Scotts Bridge (R6172), 1 larva 24 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 1 larva 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Glenveagh National Park (C0019), 2♀♀ 10-30 July 1998 & 1♂1♀ 12 August-2 September 1998, Malaise traps in a mature acidophilous *Quercus* forest along a river, M. C. D. Speight.

DOWN: Hillsborough Estate (J2457), 1♂ 27 September-6 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 1 larva 28 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Lepidostoma basale* (Kolenati, 1848) New to Counties Clare, Cork, Mayo, Sligo and Wicklow (Fig. 49)**

CLARE: bridge on river near Spancelhill (R3880), 8 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 68 larvae 23 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

GALWAY: Duniry River, south-west of Duniry (M7209), 3 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

KERRY: River Flesk, bridge near Glenflesk (W0685), 1 larva 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Keerglen River, bridge north-east of Doondragon (G0933), 3 larvae 1 November 2002. River Moy, at Bleanmore (G2600), 10 larvae 6 October 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 11 larvae 17 October 2002. Dunneill River, near Dromore West (G4334), 2 larvae 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 13 larvae 28 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Lepidostoma hirtum* (Fabricius, 1775) (Fig. 50)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 6 June 2016, collected & determined R. Monteith (NBN, 2020).

CLARE: Glendine River, Knockloskeraun Bridge (R0577), 61 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 1 larva 23 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 55 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 181 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 40 larvae 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 344 larvae 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 310 larvae. Eanymore Water, bridge south-west of Letterbarra (G8882), 139 larvae 16 October 2002. Gweebarra River, Pollglass Bridge (B9413), 1 larva 15 October 2002. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 63 larvae 14 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019.

DUBLIN: River Dodder, upstream of the reservoir (O1120), 6 larvae 10 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Duniry River, south-west of Duniry (M7209), 67 larvae 12 June 2003. Owendalulleegh River, ford at Inchamore (R5699), 44 larvae 7 November 2002. Owenglin River, bridge south-west of Clifden Lodge (L6750), 40 larvae 6 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Rosroe [Barrna-nOra] (L7541), 5♀♀ 29 July-10 August 1994 & 1♀ 21 September-7 October 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

KERRY: Finow River, downstream of Lough Guitane (W0185), 141 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019). Old Kenmare Road, Killarney National Park (V9582), 1♂ 1-21 July 1995, Malaise trap on moor, *Ulex* thickets and unimproved montane non-calcareous grassland with a stream in a gully, M. C. D. Speight. Owenmore River, bridge at Boherboy (Q5110), 13 larvae 11 March 2003. Owenreagh River, bridge upstream of the Upper Lake (V8882), 86 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 43 larvae 12 March 2003. River Flesk, bridge near Glenflesk (W0685), 108 larvae 13 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LIMERICK: River Bilboa, north-west of Doon (R8151), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Keerglen River, bridge north-east of Doondragon (G0933), 10 larvae 18 February 2003. River Moy, at Bleanmore (G2600), 14 larvae 6 October 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 3 larvae 17 October 2002. Dunneill River, near Dromore West (G4334), 41 larvae 13 February 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 2 larvae 19 February 2003. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 1 larva 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 31 larvae 10 June 2003. River Moy, bridge south-east of Cloonacool (G4916), 2 larvae 9 June 2003.
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 52 larvae 19 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 40 larvae 25 February 2003. Glenealo River, upstream of the Upper Lake, Glendalough (T0896), 1 larva 28 November 2002. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 3 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 2 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMNEPHILIDAE

***Drusus annulatus* (Stephens, 1837) New to County Limerick (Fig. 51)**
CLARE: Bow River, Bow River Bridge (R6687), 3 larvae 5 March 2003. Broadford River, near Scotts Bridge (R6172), 4 larvae 24 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 1 larva 4 March 2003. Graney River, Caher Bridge south of Lough Graney (R5590), 5 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Eanymore Water, Eanymore Bridge (G8481), 1 larva 15 October 2002. Eanymore Water, bridge south-west of Letterbarra (G8882), 1 larva 16 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DOWN: Hillsborough Estate (J2457), 1♂ 18-26 September 2019, Rothamsted Insect Survey light-trap per A. Riley.
DUBLIN: River Dodder, upstream of the reservoir (O1120), 29 larvae 7 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Shanganagh River, Kilternan (O2021), 1♂ 23 September 2019, collected & determined J. T. Brophy.
LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 5 larvae 12 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 39 larvae 13 March 2003. River Bilboa, north-west of Doon (R8151), 5 larvae 5 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 41 larvae 14 February 2003. River Moy, at Bleanmore (G2600), 1 larva 19 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 29 larvae 13 February 2003. Dunneill River, near Dromore West (G4334), 57 larvae 10 June 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 1 larva 13 February 2003. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 5 larvae 17 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 5 larvae 5 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 11 larvae 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Little Slaney, ford downstream of Rostyduff Bridge (S9492), 1 larva 26 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
***Ecclisopteryx dalecarlica* Kolenati, 1848 New to Counties Dublin, Mayo and Sligo (Fig. 52)**
DONEGAL: Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 3 larvae 11 February 2003. Eanymore Water, bridge south-west of Letterbarra (G8882), 1 larva 12 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DUBLIN: River Liffey, downstream of Ballyward Bridge (O0216), 3 larvae 29 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 3 larvae 18 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 1 larva 10 June 2003. Dunneill River, near Dromore West (G4334), 28 larvae 17 October 2002. Gowlan River, upstream of the confluence with the Easky River (G3826), 3 larvae 4 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 1 larva 13 February 2003. River Moy, bridge south-east of Cloonacool (G4916), 5 larvae 17 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 3 larvae 28 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Chaetopteryx villosa* (Fabricius, 1798) New to Counties Donegal, Leitrim and Sligo (Fig. 53)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 6 October 2015 & adult 19 November 2017, collected & determined R. Monteith (NBN, 2020).

CAVAN: Swanlinbar River, Commas Bridge (H1424), 1 larva 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 1 larva 11 June 2003. Bridge on river near Spancelhill (R3880), 11 larvae 11 June 2003. Glendine River, Knockloskeraun Bridge (R0577), 1 larva 11 June 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 1 larva 11 February 2003. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 2 larvae 5 June 2003. Eanymore Water, Eanymore Bridge (G8481), 1 larva 5 June 2003. Eanymore Water, bridge south-west of Letterbarra (G8882), 2 larvae 5 June 2003. Gweebarra River, Pollglass Bridge (B9413), 1 larva 15 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DUBLIN: River Dodder, upstream of the reservoir (O1120), 8 larvae 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Ballycahalan River [Boleyneendorrish], north-east of Gort (M5105), 1 larva 12 June 2003. Duniry River, south-west of Duniry (M7209), 2 larvae 12 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KERRY: Owenmore River, bridge at Boherboy (Q5110), 4 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 1 larva 19 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 1 larva 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 4 larvae 9 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Owengarve River, ford north-west of Srah Upper (G5503), 1 larva 10 June 2003. Dunneill River, near Dromore West (G4334), 1 larva 10 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 1 larva 23 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 8 larvae 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WICKLOW: Little Slaney, ford south of Coan (S9891), 3 larvae 27 June 2003. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 5 larvae 27 June 2003. River Slaney, Waterloo

Bridge (S9093), 2 larvae 3 July 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Anabolia nervosa* (Curtis, 1834) (Fig. 54)**

ANTRIM: Quolie Reservoir (D1813), 4♂♂ 18 September 2019, C. McNaughton.

CLARE: Inis Cealtra, Lough Derg (R6985), 1♀ 24 October 2019, collected & determined J. T. Brophy.

CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DONEGAL: Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 4 larvae 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DOWN: Hillsborough Estate (J2457), 1♂ 18-26 September 2019 & 1♂ 27 September-6 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

FERMANAGH: Colebrooke River (H4044), adult 25 May 2013, collected & determined staff of CEDaR (NBN, 2020).

KERRY: River Flesk, bridge near Glenflesk (W0685), 8 larvae 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

ROSCOMMON: Lough Ree, Rinnagan (N0056), 1♂ 12 October 2019, collected & determined J. T. Brophy.

WICKLOW: Little Slaney, Ford downstream of Rostyduff Bridge (S9492), 3 larvae 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Glyphotaelius pellucidus* (Retzius, 1783) (Fig. 55)**

DUBLIN: Dublin Zoo (O1235), 1♀ 23 August-10 September 2019, Rothamsted Insect Survey light-trap per A. Riley.

GALWAY: Duniry River, south-west of Duniry (M7209), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Limnephilus affinis* Curtis, 1834 (Fig. 56)**

CORK: Fota Wildlife Park (W7871), 1♀ 16-22 September 2019, 1♂ 23-29 September 2019 & 1♂ 30 September-6 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

DUBLIN: Dublin Zoo (O1235), 1♂ 11 September-11 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

GALWAY: Rosroe [Barrna-nOra] (L7541), 1♀ 29 July-10 August 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

***Limnephilus auricula* Curtis, 1834 New to County Roscommon (Fig. 57)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 1 June 2015, adult 7 October 2015 & adult 1 October 2017, collected & determined R. Monteith (NBN, 2020).

DERRY (LONDONDERRY): Kilmaconnell Road near the Lower Bann River (C8529), 3 adults 6 May 2018, collected & determined T. Edwards (NBN, 2020).
DOWN: Hillsborough Estate (J2457), 1♂ 9-21 October 2019, Rothamsted Insect Survey light-trap per A. Riley.
MAYO: Ballycroy (Mayo) National Park (F8607), 3♀♀ 30 May-20 June 1997 & 1♂ 1-20 July 1997, Malaise traps on an open grassy trackside within a *Pinus* planatation beside the Gennamong River which flows through bogland, M. C. D. Speight.
ROSCOMMON: Lough Ree, Rinnagan (M9956), 1♂ 4 May 2019, collected & determined J. T. Brophy.

***Limnephilus centralis* Curtis, 1834 (Fig. 58)**

DONEGAL: Glenveagh National Park (C0019), 1♀ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest along a river, M. C. D. Speight.
GALWAY: Connemara National Park (L7156), 1♂ 8-26 June 1994, Malaise trap on montane, unimproved, humid and non-calcareous grassland with a stream, M. C. D. Speight. Rosroe [Barrna-nOra] (L7541), 6♂♂2♀♀ 29 July-10 August 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.
KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♂ 1-21 July 1995 & 1♀ 1-21 August 1995, Malaise traps on moor with *Ulex* thickets, unimproved montane non-calcareous grassland with a stream in a gully, M. C. D. Speight.
MAYO: Ballycroy National Park (F9403), 2♂♂2♀♀ 30 May-20 June 1997, Malaise trap on open, grassy trackside within a *Pinus* plantation beside the Glennamong River, M. C. D. Speight.

***Limnephilus decipiens* (Kolenati, 1848) New to County Limerick (Fig. 59)**

LIMERICK: Blossomhill, near Doohyle Lough (R3744), 1♀ 2 October 2019, collected & determined J. T. Brophy.

***Limnephilus elegans* Curtis, 1834**

GALWAY: Connemara National Park (L7156), 1♂5♀♀ 8-26 June 1994, Malaise trap on montane, unimproved, humid and non-calcareous grassland with a stream, M. C. D. Speight.
KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♀ 1-21 June 1995, Malaise trap on unimproved oligotrophic, montane non-calcareous grassland and montane improved grassland near the Owengariff River, M. C. D. Speight.

***Limnephilus flavicornis* (Fabricius, 1787) (Fig. 60)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 18 August 2015, adult 14 October 2015 & adult 24 May 2016, collected & determined R. Monteith (NBN, 2020). Lowwood, Belfast (J3378), 1♂ 6-13 August 2019, light-trap in a suburban garden, P. Thomlinson.

These are only the second and third localities for County Antrim.

DOWN: Hillsborough Estate (J2457), 1♀ 18-26 September 2019, Rothamsted Insect Survey light-trap per A. Riley.

DUBLIN: Dublin Zoo (O1235), 2♀♀ 23 August-10 September 2019 & 2♀♀ 11 September-11 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

***Limnephilus griseus* (Linnaeus, 1758) (Fig. 61)**

GALWAY: Connemara National Park (L7156), 1♂1♀ 8-26 June 1994, Malaise trap on montane, unimproved, humid and non-calcareous grassland with a stream, M. C. D. Speight. Rosroe [Barrna-nOra] (L7541), 1♀ 29 July-10 August 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

***Limnephilus hirsutus* (Pictet, 1834) New to County Kerry (Fig. 62)**

DONEGAL: Glenveagh National Park (C0018), 1♂ 10-30 July 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane unimproved grassland along a river, M. C. D. Speight. Tory Island (B8447), 1♂1♀ 11 June 2016, moth trap, collected L. Clarke, determined M. P. Gammell.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♂ 1-21 July 1995, Malaise trap on moor with *Ulex* thickets, unimproved montane non-calcareous grassland with a stream in a gully, M. C. D. Speight.

WATERFORD: Ballin Lough, Kill (S4403), 1♂ 11 September 2019, light-trap, A. Walshe.

***Limnephilus lunatus* Curtis, 1834 (Fig. 63) (Fig. 63)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), 2 adults 16 October 2013, in light-trap, & adult 27 September 2015, collected & determined R. Monteith (NBN, 2020). Lowwood, Belfast (J3378), 1♀ 6-13 August 2019, light-trap in a suburban garden, P. Thomlinson. Stoneyford (reservoir) (J2169), adult 17 October 2016, collected & determined S. Belshaw (NBN, 2020). Quolie Reservoir (D1813), 2♀♀ 18 September 2019, C. McNaughton.

ARMAGH: Peatlands Park (H8960), adult 10 October 2013, on a building wall near an outside light, collected & determined S. Foster (NBN, 2020).

CLARE: bridge on river near Spancelhill (R3880), 7 larvae 11 June 2003. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 1 larva 11 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Fota Wildlife Park (W7871), 1♂ 23-29 September 2019, Rothamsted Insect Survey light-trap per A. Riley. Sullane River, Linnamilla Bridge (W3172), 8 larvae 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DOWN: Hillsborough Estate (J2457), 1♂ 27 September-6 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

DUBLIN: Dublin Zoo (O1235), 1♀ 11 September-11 October 2019, Rothamsted Insect Survey light-trap per A. Riley. St Brigids GAA Club, Castleknock (O0937), 1♂ 1 October 2019 & 1♂ 20 October 2019, resting on a wall under an outdoor light, J. P. O'Connor & M. A. O'Connor.
GALWAY: Owenglin River, bridge south-west of Clifden Lodge (L6750), 2 larvae 20 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
KERRY: Finow River, downstream of Lough Guitane (W0185), 5 larvae 2 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
LIMERICK: Ballyellinan (R3149), 1♀ 2 October 2019, collected & determined J. T. Brophy. Previously only known in County Limerick from larvae.
MAYO: River Moy, at Bleanmore (G2600), 2 larvae 19 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
SLIGO: Dunneill River, near Dromore West (G4334), 1 larva 10 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
WATERFORD: Ballin Lough, Kill (S4403), 1♀ 11 September 2019, light-trap, A. Walshe.

***Limnephilus luridus* Curtis, 1834 (Fig. 64)**

GALWAY: Connemara National Park (L7156), 6♂♂37♀♀ 8-26 June 1994, Malaise trap on montane, unimproved, humid and non-calcareous grassland with a stream, M. C. D. Speight. Rosroe [Barrna-nOra] (L7541), 1♂ 28 April-19 May 1994, 8♂♂15♀♀ 29 July-10 August 1994 & 2♀♀ 21 September-7 October 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor with a river, M. C. D. Speight.
MAYO: Ballycroy National Park (F9403), 4♀♀ 30 May-20 June 1997, Malaise trap on open, grassy trackside within a *Pinus* plantation beside the Glennamong River, M. C. D. Speight.
WATERFORD: Tramore (S5701), 1♂ 31 July 2019, 125w MV Robinson, T. Bryant. A female was previously taken in the Tramore trap.

***Limnephilus marmoratus* Curtis, 1834 (Fig. 65)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 17 August 2015, in moth trap, collected & determined R. Monteith (NBN, 2020).
CLARE: bridge on river near Spancelhill (R3880), 1 larva 11 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
DONEGAL: Tory Island (B8745), 1 larva 11 June 2016, sweep/kick sample, collected & determined M. P. Gammell & C. M. Carlin.
DOWN: Hillsborough Estate (J2457), 2♀♀ 7-14 August 2019, 2♀♀ 15-26 August 2019, 2♀♀ 27 August-3 September 2019, 1♀ 5-16 September 2019 & 2♂♂1♀ 18-26 September 2019, Rothamsted Insect Survey light-trap per A. Riley.
KERRY: Finow River, downstream of Lough Guitane (W0185), 1 larva 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KILDARE: lake, Castletown Estate, Celbridge (N9833), 1♀ 25 September 2019 & 1♀ 20 October 2019, both dead in spiders' webs, J. P. O'Connor & M. A. O'Connor.

WATERFORD: Ballin Lough, Kill (S4403), 3♀♀ 11 September 2019, light-trap, A. Walshe.

A male was taken on the northern shore of Ballin Lough (S4503) in 1988.

***Limnephilus nigriceps* (Zetterstedt, 1840) (Fig. 66)**

ANTRIM: Quolie Reservoir (D1813), 1♂ 18 September 2019, C. McNaughton.

WESTMEATH: Scragh Bog (N4259), 1♂ 11 October 2019, collected & determined J. T. Brophy.

The species has previously been taken in pools on another section of Scragh Bog (N4357).

***Limnephilus rhombicus* (Linnaeus, 1758) (Fig. 67)**

ANTRIM: Stoneyford (reservoir) (J2169), adult 17 October 2016, collected & determined S. Belshaw (NBN, 2020).

CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KERRY: Old Kenmare Road, Killarney National Park (V9582), 1♀ 1-21 July 1995, Malaise traps on moor, *Ulex* thickets and unimproved montane non-calcareous grassland with a stream in a gully, M. C. D. Speight.

These are the second and third Kerry specimens. A ♂ was previously taken at the Owengarrif River in the same grid square.

MAYO: Ballycroy (Mayo) National Park (F8607), 1♀ 30 May-20 June 1997, Malaise trap on cutover blanket bog along a river, M. C. D. Speight.

SLIGO: River Moy, bridge south-east of Cloonacool (G4916), 2 larvae 9 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WICKLOW: Little Slaney, ford downstream of Rostyduff Bridge (S9492), 1 larva 29 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Limnephilus sparsus* Curtis, 1834 (Fig. 68)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584), adult 13 May 2014, adult 25 April 2019, in MV moth trap & adult 6 June 2015, collected & determined R. Monteith (NBN, 2020).

DUBLIN: Dublin Zoo (O1235), 1♀ 23 August-10 September 2019, Rothamsted Insect Survey light-trap per A. Riley.

GALWAY: Connemara National Park (L7156), 3♂♂1♀ 8-26 June 1994, Malaise trap on montane, unimproved, humid and non-calcareous grassland with a stream, M. C. D. Speight. Rosroe [Barrna-nOra] (L7541), 1♀ 28 April-19 May 1994 & 2♂♂1♀ 29 July-10 August 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

LEITRIM: Cormongan (G9716), 1♂ 1 September 2019, collected & determined J. T. Brophy.
MAYO: Ballycroy (Mayo) National Park (F9403), 14♂♂8♀♀ 30 May-20 June 1997, 14♂♂1♀ 1-20 July 1997 & 1♀ 1-20 August 1997, Malaise traps on open, grassy trackside within a *Pinus* plantation beside the Gennamong River which flows through bogland, M. C. D. Speight.

***Limnephilus stigma* Curtis, 1834**

ANTRIM: Quolie Reservoir (D1813), 2♂♂3♀♀ 18 September 2019, C. McNaughton.

***Halesus digitatus* (Schrank, 1781) New to Counties Clare and Sligo (Fig. 69)**

ANTRIM: Greenmount Campus near the Six Mile Water River (J1584) adult 16 October 2013 & adult 1 October 2015, in moth traps, collected & determined R. Monteith (NBN, 2020).
CLARE: bridge on river near Spancelhill (R3880), 2 larvae 4 March 2003. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 1 larva 4 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 1 larva, 11 February 2003. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 4 larvae 11 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
DUBLIN: River Dodder, upstream of the reservoir (O1120), 1 larva 3 June 2003. River Liffey, downstream of Ballyward Bridge (O0216), 17 larvae 7 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 1 larva 21 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
KERRY: River Flesk, bridge near Glenflesk (W0685), 8 larvae 24 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 1 larva 9 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: River Moy, bridge south-east of Cloonacool (G4916), 2 larvae 9 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 2 larvae 27 June 2003. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 2 larvae 27 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Halesus radiatus* (Curtis, 1834) (Fig. 70)**

ANTRIM: Greenmount Campus near Six Mile Water River (J1584), adult 2 November 2015, adult 21 September 2017 & adult 5 October 2018, in moth traps, collected & determined R. Monteith (NBN, 2020).
CAVAN: Swanlinbar River, Commas Bridge (H1424), 2 larvae 17 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CLARE: Bow River, Bow River Bridge (R6687), 1 larva 5 March 2003. Bridge on river near Spancelhill (R3880), 19 larvae 4 March 2003. Broadford River, near Scotts Bridge (R6172), 14 larvae 5 March 2003. Glendine River, Knockloskeraun Bridge (R0577), 6 larvae 4 March 2003. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 5 larvae 4 March 2003. Graney River, Caher Bridge south of Lough Graney (R5590), 5 larvae 24 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Inis Cealtra, Lough Derg (R6985), 1♂1♀ 24 October 2019, collected & determined J. T. Brophy.
CORK: Fota Wildlife Park (W7871), 1♀ 16-22 September 2019, Rothamsted Insect Survey light-trap per A. Riley. Glengarriff River, bridge west of Skehil (V8958), 4 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 29 larvae 13 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 11 larvae 11 February 2003. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 14 larvae 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 3 larvae 11 February 2003. Eanymore Water, bridge south-west of Letterbarra (G8882), 14 larvae 12 February 2003. Gweebarra River, Pollglass Bridge (B9413), 2 larvae 11 February 2003. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 15 larvae 10 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DOWN: Bleary (J0753), adult 29 September 2016, flew into a house with a very small stream at the bottom of the garden, collected & determined S. Foster (NBN, 2020). Hillsborough Estate (J2457), 3♂♂1♀ 18-26 September 2019 & 1♂ 9-21 October 2019, Rothamsted Insect Survey light-trap per A. Riley.
DUBLIN: Dublin Zoo (O1235), 1♂ 11 September-11 October 2019, Rothamsted Insect Survey light-trap per A. Riley. River Dodder, Rathfarnham (O1328), 3♂♂ 6 October 2019, J. P. O'Connor & M. A. O'Connor; upstream of the reservoir (O1120), 2 larvae 7 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). River Liffey, downstream of Ballyward Bridge (O0216), 7 larvae 29 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019); River Liffey, Strawberry Beds (O0936), 1♂ 10 October 2019, freshly killed in a spider's web in the Angler's Rest carpark, J. P. O'Connor & M. A. O'Connor.
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 9 larvae 21 February 2003. Duniry River, south-west of Duniry (M7209), 3 larvae 12 June 2003. Owendalulleegh River, ford at Inchamore (R5699), 4 larvae 21 February 2003. Owenglin River, bridge south-west of Clifden Lodge (L6750), 14 larvae 20 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Rosroe [Barrna-nOra] (L7541), 1♂1♀ 21 September-7 October 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

KERRY: Finow River, downstream of Lough Guitane (W0185), 8 larvae 2 March 2003. Owenmore River, bridge at Boherboy (Q5110), 16 larvae 19 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 3 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 1 larva 12 March 2003. River Flesk, bridge near Glenflesk (W0685), 6 larvae 13 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KILDARE: River Liffey, Castletown Estate, Celbridge (N9733), 1♀ 20 October 2019, J. P. O'Connor & M. A. O'Connor.

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 3 larvae 5 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 16 larvae 13 March 2003. River Bilboa, north-west of Doon (R8151), 8 larvae 5 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Clydagh River, near Burren (M1496), 8 larvae 19 February 2003. Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 14 larvae 14 February 2003. Keerglen River, bridge north-east of Doondragon (G0933), 4 larvae 18 February 2003. River Moy, at Bleanmore (G2600), 6 larvae 19 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 6 larvae 13 February 2003. Dunneill River, near Dromore West (G4334), 27 larvae 13 February 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 7 larvae 4 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 3 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 1 larva 10 June 2003. River Moy, bridge south-east of Cloonacool (G4916), 22 larvae 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 7 larvae 5 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 2 larvae 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 1 larva 28 November 2002. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 2 larvae 28 November 2002. Little Slaney, ford south of Coan (S9891), 10 larvae 26 February 2003. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 24 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 3 larvae 26 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Micropterna lateralis* (Stephens, 1837) (Fig. 71)**

CORK: Fota Wildlife Park (W7871), 1♀ 21-27 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

DONEGAL: Glenveagh National Park (C0018), 1♂ 10-30 June 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane and unimproved grassland along a river, M. C. D. Speight.

KERRY: Old Kenmare Road, Killarney National Park (V9582), 3♂♂ 1-21 June 1995, Malaise trap on cutover blanket bog with *Ulex* thickets, 2♀♀ 1-21 June 1995, Malaise trap on unimproved oligotrophic, montane non-calcareous grassland and montane improved grassland near the Owengariff River, M. C. D. Speight.

***Micropterna sequax* McLachlan, 1875**

DONEGAL: Glenveagh National Park (C0019), 1♀ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest along a river, M. C. D. Speight.

***Potamophylax cingulatus* (Stephens, 1837) New to Counties Galway, Leitrim and Limerick (Fig. 72)**

CLARE: Bow River, Bow River Bridge (R6687), 4 larvae 24 October 2002. Bridge on river near Spancelhill (R3880), 7 larvae 4 March 2003. Broadford River, near Scotts Bridge (R6172), 3 larvae 24 October 2002. Glendine River, Knockloskeraun Bridge (R0577), 2 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 9 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 14 larvae 24 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 6 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 5 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 7 larvae 11 February 2003. Eanymore Water, Eanymore Bridge (G8481), 3 larvae 15 October 2002. Eanymore Water, bridge south-west of Letterbarra (G8882), 1 larva 16 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Glenveagh National Park (C0018), 1♂1♀ 10-30 July 1998, Malaise trap on humid non-calcareous (*Molinia*) oligotrophic montane unimproved grassland along a river, M. C. D. Speight. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 24 larvae 14 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DOWN: Hillsborough Estate (J2457), 1♂ 5-16 September 2019, Rothamsted Insect Survey light-trap per A. Riley. RSPB Belfast Lough Reserve (J3777), 1♂ 1 September 2019, light-trap, P. Thomlinson.

DUBLIN: River Dodder, upstream of the reservoir (O1120), 19 larvae 28 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 6 larvae 7 November 2002. Duniry River, south-west of Duniry (M7209), 31 larvae 7 November 2002. Owendalulleegh River, ford at Inchamore (R5699), 21 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
KERRY: Finow River, downstream of Lough Guitane (W0185), 44 larvae 20 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Old Kenmare Road, Killarney National Park (V9582), 1♂2♀♀ 1-21 August 1995, Malaise traps on cutover blanket bog and moor, M. C. D. Speight. Owenmore River, bridge at Boherboy (Q5110), 11 larvae 19 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 14 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 5 larvae 19 November 2002. River Flesk, bridge near Glenflesk (W0685), 14 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 1 larva 12 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
LIMERICK: Funshion River, Brackbaun Bridge (R8816), 11 larvae 8 November 2002. River Bilboa, north-west of Doon (R8151), 25 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
MAYO: Ballycroy (Mayo) National Park (F8607), 1♀ 30 May-20 June 1997, Malaise trap on cutover blanket bog along a river, 1♂3♀♀ 1-20 August 1997, Malaise trap on an open grassy trackside within a *Pinus* planatation, M. C. D. Speight. Clydagh River, near Burren (M1496), 8 larvae 31 October 2002. Keerglen River, bridge north-east of Doondragon (G0933), 1 larva 1 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 2 larvae 13 February 2003. Dunneill River, near Dromore West (G4334), 2 larvae 17 October 2002. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 2 larvae 13 February 2003. Owengarve River, ford north-west of Srah Upper (G5503), 7 larvae 30 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 7 larvae 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 3 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 16 larvae 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 6 larvae 28 November 2002. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 2 larvae 28 November 2002. Little Slaney, ford south of Coan (S9891), 3

larvae 29 November 2002. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 8 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 8 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Potamophylax latipennis* (Curtis, 1834) (Fig. 73)**

CLARE: Glendine River, Knockloskeraun Bridge (R0577), 1 larva 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 3 larvae 4 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 25 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 5 June 2003. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 18 larvae 10 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

GALWAY: Duniry River, south-west of Duniry (M7209), 3 larvae 3 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

KERRY: River Flesk, bridge near Glenflesk (W0685), 3 larvae 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Ballycroy (Mayo) National Park (F8607), 2♂♂2♀♀ 30 May-20 June 1997, Malaise trap on cutover blanket bog along a river, M. C. D. Speight.

ROSCOMMON: Rinnagan (M9955), 1♂ 11 October 2019, collected & determined J. T. Brophy.

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 2 larvae 13 February 2003. Dunneill River, near Dromore West (G4334), 2 larvae 10 June 2003. Owengarve River, ford north-west of Srah Upper (G5503), 4 larvae 10 June 2003. River Moy, bridge south-east of Cloonacool (G4916), 1 larva 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WATERFORD: Ballin Lough, Kill (S4403), ♂ 11 September 2019, light-trap, A. Walshe. Ballyristeen, stream (S4301), 4♂♂ 10 September 2019, light-trap, A. Walshe.

WICKLOW: Little Slaney, ford downstream of Rostyduff Bridge (S9492), 5 larvae 27 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Stenophylax permistus* McLachlan, 1895 New to County Tipperary (Fig. 74)**

CLARE: Glendine River, Knockloskeraun Bridge (R0577), 1 larva 23 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

CORK: Fota Wildlife Park (W7871), 2♂♂ 30 September-6 October 2019 & 2♂♂ 7-13 October 2019, Rothamsted Insect Survey light-trap per A. Riley.

GALWAY: Rosroe [Barrna-nOra] (L7541), 1♂ 28 April-19 May 1994, Malaise trap at a *Picea/Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.
MAYO: River Moy, at Bleanmore (G2600), 1 larva 19 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
ROSCOMMON: Lough Ree, Rinnagan (M9956), 1♂ 5 May 2019, collected & determined J. T. Brophy.
TIPPERARY: Old Desmond Cave (R9216), 2♂♂ 7 July 2019, resting inside the cave which is part of the Mitchelstown complex, collected & determined M. Nolan.

SERICOSTOMATIDAE

***Sericostoma personatum* (Spence, 1826) (Fig. 75)**
CLARE: bridge on river near Spancelhill (R3880), 15 larvae 23 October 2002. Broadford River, near Scotts Bridge (R6172), 20 larvae 5 March 2003. Glendine River, Knockloskeraun Bridge (R0577), 18 larvae 23 October 2002. Gourna River, bridge upstream of confluence with the Owenogarney River (R4864), 8 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 5 larvae 21 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
CORK: Glengarriff River, bridge west of Skehil (V8958), 4 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 37 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 16 larvae 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 39 larvae 15 October 2002. Eanymore Water, Eanymore Bridge (G8481), 14 larvae 11 February 2003. Eanymore Water, bridge south-west of Letterbarra (G8882), 39 larvae 16 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019). Glenveagh National Park (C0120), 1♀ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest beside Lough Veagh, (C0018), 2♂♂ 10-30 June 1998 & 1♂ 10-30 July 1998, Malaise traps on humid non-calcareous (*Molinia*) oligotrophic montane and unimproved grassland along a river, M. C. D. Speight. River Ballyhallan, bridge upstream of the Clonmany River (C3646), 87 larvae 10 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DUBLIN: River Dodder, upstream of the reservoir (O1120), 2 larvae 7 March 2003. River Liffey, downstream of Ballyward Bridge (O0216), 1 larva 7 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
GALWAY: Ballycahalan River (Boleyneendorrish), north-east of Gort (M5105), 8 larvae 21 February 2003. Duniry River, south-west of Duniry (M7209), 12 larvae 7 November 2002. Owendalulleegh River, ford at Inchamore (R5699), 31 larvae 21 February 2003. Owenglin

River, bridge south-west of Clifden Lodge (L6750), 3 larvae 7 October 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

KERRY: Finow River, downstream of Lough Guitane (W0185), 25 larvae 2 March 2003. Owenmore River, bridge at Boherboy (Q5110), 5 larvae 11 March 2003. Owenreagh River, bridge upstream of the Upper Lake (V8882), 20 larvae 19 November 2002. River Blackwater, Gearha Bridge, west of Kenmare (V7872), 1 larva 19 November 2002. River Flesk, bridge near Glenflesk (W0685), 15 larvae 13 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 17 larvae 12 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 10 larvae 8 November 2002. River Bilboa, north-west of Doon (R8151), 18 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Ballycroy (Mayo) National Park (F8607), 1♂1♀ 30 May-20 June 1997, Malaise trap on cutover blanket bog along a river, M. C. D. Speight. Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 16 larvae 14 February 2003. Keerglen River, bridge north-east of Doondragon (G0933), 5 larvae 18 February 2003. River Moy, at Bleanmore (G2600), 21 larvae 6 October 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 10 larvae 17 October 2002. Dunneill River, near Dromore West (G4334), 15 larvae 17 October 2002. Gowlan River, upstream of the confluence with the Easky River (G3826), 5 larvae 13 February 2003. Owenbeg River, upstream of ford south-west of Shancough (Bridge) (G5623), 1 larva 17 October 2002. River Moy, bridge south-east of Cloonacool (G4916), 2 larvae 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 21 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 23 larvae 19 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 32 larvae 25 February 2003. Glenealo River upstream of the Upper Lake, Glendalough (T0896), 3 larvae 28 November 2002. Little Slaney, ford south of Coan (S9891), 3 larvae 29 November 2002. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 15 larvae 29 November 2002. River Slaney, Waterloo Bridge (S9093), 14 larvae 29 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

BERAEIDAE

***Berea maurus* (Curtis, 1834) New to County Leitrim (Fig. 76)**

CLARE: bridge on river near Spancelhill (R3880), 1 larva 23 October 2002. Broadford River, near Scotts Bridge (R6172), 1 larva 24 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Glenveagh National Park (C0019), 11♀♀ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest along a river, M. C. D. Speight.

This is the second record for County Donegal, the species having been previously taken on the Ballyhallan River (C3646).

DUBLIN: River Dodder, upstream of the reservoir (O1120), 1 larva 28 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

GALWAY: Rosroe [Barrna-nOra] (L7541), 1♀ 29 July-10 August 1994, Malaise trap at a *Picea*/*Pinus* plantation with cutover blanket bog/moor and a river, M. C. D. Speight.

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 1 larva 16 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

SLIGO: Dunneill River, near Dromore West (G4334), 1 larva 13 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 1 larva 28 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Beraea pullata* (Curtis, 1834) (Fig. 77)**

CLARE: Glendine River, Knockloskeraun Bridge (R0577), 1 larva 4 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

DONEGAL: Glenveagh National Park (C0323), 2♀♀ 10-30 June 1998, Malaise trap on humid, non-calcareous, oligotrophic montane unimproved grassland and scattered mature/overmature *Betula* & *Quercus* along a river, (C0019), 1♀ 10-30 June 1998, Malaise trap in acidophilous *Quercus* forest along a river, M. C. D. Speight.

DOWN: Carrowcarlin (J5548), Lough Money Fen, southern part (J5345), stream near Ballynagross (J5343), stream near Corbally (J4538), larvae all 1 May-30 June 2007, collected & determined Northern Ireland Environment Agency (NBN, 2020).

ODONTOCERIDAE

***Odontocerum albicorne* (Scopoli, 1763) New to County Leitrim (Fig. 78)**

CLARE: Bow River, Bow River Bridge (R6687), 4 larvae 24 October 2002. Bridge on river near Spancelhill (R3880), 36 larvae 23 October 2002. Broadford River, near Scotts Bridge (R6172), 11 larvae 11 June 2003. Gourna River, bridge upstream of confluence with the

Owenogarney River (R4864), 5 larvae 23 October 2002. Graney River, Caher Bridge south of Lough Graney (R5590), 2 larvae 24 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

CORK: Glengarriff River, bridge west of Skehil (V8958), 2 larvae 20 November 2002. Sullane River, Linnamilla Bridge (W3172), 14 larvae 20 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DERRY (LONDONDERRY): Ballygonny Bridge, Ballymully River (H8778), 1 larva 26 June 1995, collected & determined IRTU Freshwater Survey (NBN, 2020).

DONEGAL: Cronaniv Burn, bridge upstream of Dunlewy Lough (B9218), 3 larvae 15 October 2002. Eany Water, downstream of the Eanybeg/Eanymore confluence (G8481), 1 larva 15 October 2002. Eanymore Water, Eanymore Bridge (G8481), 2 larvae 15 October 2002. Eanymore Water, bridge south-west of Letterbarra (G8882), 1 larva 16 October 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

DUBLIN: River Dodder, upstream of the reservoir (O1120), 1 larva 3 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

GALWAY: Owendalulleegh River, ford at Inchamore (R5699), 1 larva 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

KERRY: Finow River, downstream of Lough Guitane (W0185), 20 larvae 2 March 2003. Owenmore River, bridge at Boherboy (Q5110), 13 larvae 19 November 2002. River Flesk, bridge near Glenflesk (W0685), 2 larvae 13 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LEITRIM: Bonet River, bridge upstream of Glenade Lough (G8247), 2 larvae 12 February 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

LIMERICK: Funshion River, Brackbaun Bridge (R8816), 4 larvae 13 March 2003. River Bilboa, north-west of Doon (R8151), 16 larvae 7 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

MAYO: Cregganlar River [Behy], bridge south-west of Bunnyconnellan [Ballycommellan] (G3217), 7 larvae 18 October 2002. Keerglen River, bridge north-east of Doondragon (G0933), 7 larvae 1 November 2002. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

SLIGO: Dunneill River, Donaghintraine Bridge (G4334), 1 larva 13 February 2003. Dunneill River, near Dromore West (G4334), 11 larvae 10 June 2003. Gowlan River, upstream of the confluence with the Easky River (G3826), 3 larvae 13 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

TIPPERARY: Mulkear River (Newport), bridge near Glanculloo Old School (R8368), 10 larvae 7 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

WEXFORD: Urrin River, Ballycrystal Bridge (S8648), 3 larvae 9 October 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
WICKLOW: Glencree River, bridge upstream of the confluence with the Dargle River (O2014), 2 larvae 27 June 2003. Little Slaney, ford south of Coan (S9891), 2 larvae 27 June 2003. Little Slaney, ford downstream of Rostyduff Bridge (S9492), 5 larvae 26 February 2003. River Slaney, Waterloo Bridge (S9093), 2 larvae 26 February 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

LEPTOCERIDAE

***Athripsodes albifrons* (Linnaeus, 1758) New to County Antrim (Fig. 79)**
ANTRIM: Moreland's Meadows, River Lagan (J3369), adult 5 July 2016, collected & determined P. McErlean (NBN, 2020).
GALWAY: Owenriff River, Oughterard (M1142), 3♂♂1♀ 23 August 2015, 15W Actinic light-trap, M. P. Gammell.
***Athripsodes cinereus* (Curtis, 1834) (Fig. 80)**
ANTRIM: Greenmount Campus near Six Mile Water River (J1584), adult 5 July 2016, collected & determined R. Monteith (NBN, 2020).
CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 25 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
KERRY: River Flesk, bridge near Glenflesk (W0685), 2 larvae 13 March 2003. Owenreagh River, bridge upstream of the Upper Lake (V8882), 5 larvae 24 June 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
MAYO: River Moy, at Bleanmore (G2600), 1 larva 19 June 2003, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
***Ceraclea albimacula* (Rambur, 1842) (Fig. 81)**
GALWAY: Owenriff River, Oughterard (M1142), 1♀ 23 August 2015, 15W Actinic light-trap, M. P. Gammell.
***Mystacides azurea* (Linnaeus, 1761) (Fig. 82)**
ANTRIM: Greenmount Campus near Six Mile Water (J1584), adult 1 August 2015 in moth trap, collected & determined R. Monteith (NBN, 2020). Reas Wood (J1386), adult 9 August 2018, collected & determined R. Monteith (NBN, 2020). River Lagan Towpath, Stranmillis (J3370), 2 adults 8 June 2018, collected & determined P. McErlean (NBN, 2020). Six Mile Water River (J1486), adult 18 June 2016, collected & determined R. Monteith (NBN, 2020). Quolie Reservoir (D1813), 1♂ 18 September 2019, C. McNaughton.

ARMAGH: Newry Canal, Dromantine area (J0636), 3 adults 11 July 2016, collected & determined D. Savage (NBN, 2020). Oxford Island, Lough Neagh (J0462), 3 adults 6 June 2017, collected & determined S. Belshaw (NBN, 2020).
CORK: Sullane River, Linnamilla Bridge (W3172), 7 larvae 13 March 2003, collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).
DONEGAL: Glenveagh National Park (C0120), 2♂♂ 10-30 July 1998, Malaise trap in mature acidophilous *Quercus* forest beside Lough Veagh, M. C. D. Speight.
DUBLIN: Glenageary (O2427), 1♀ 20 June 2019, collected D. Mangan, determined J. T. Brophy. Shanganagh River, Hackettsland (O2523), 2♂♂ 20 September 2019, collected & determined J. T. Brophy.
FERMANAGH: River Erne, Enniskillen (H2343), adult 31 May 2018, collected & determined A. O'Doherty (NBN, 2020).
KERRY: River Blackwater, Gearha Bridge, west of Kenmare (V7872), 1 larva 12 March 2003. River Flesk, bridge near Glenflesk (W0685), 5 larvae 13 March 2003. Owenreagh River, bridge upstream of the Upper Lake (V8882), 2 larvae 12 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

***Mystacides longicornis* (Linnaeus, 1758) (Fig. 83)**

ANTRIM: Reas Wood (J1386), adult 9 August 2018, collected & determined, collected & determined R. Monteith (NBN, 2020).
ARMAGH: Craigavon Lakes (J0557), adult 15 July 2019, collected & determined A. O'Doherty (NBN, 2020).

***Oecetis furva* (Rambur, 1842) (Fig. 84)**

DONEGAL: Tory Island (B8745), 3 larvae 11 June 2016, sweep/kick sample, 5♂♂ 11 June 2016, hand net, collected & determined M. P. Gammell & C. M. Carlin.

***Oecetis lacustris* (Pictet, 1834) (Fig. 85)**

ANTRIM: Greenmount Campus near Six Mile Water River (J1584), adult 5 August 2015, moth trap, collected & determined R. Monteith (NBN, 2020).

***Oecetis ochracea* (Curtis, 1825) (Fig. 86)**

ANTRIM: Greenmount Campus near Six Mile Water River (J1584), 7 August 2015, collected & determined R. Monteith (NBN, 2020).
DONEGAL: Tory Island (B8447), 2♂♂ 10 June 2016, light-trap 15w Actinic, collected & determined M. P. Gammell & C. M. Carlin, (B8547), 2♂♂ 11 June 2016, moth trap, collected L. Clarke, determined M. P. Gammell.

***Oecetis testacea* (Curtis, 1834) (Fig. 87)**

CORK: Sullane River, Linnamilla Bridge (W3172), 1 larva 13 March 2003. collected & determined C. Bradley (Kelly-Quinn *et al.*, 2019).

KERRY: Finow River, downstream of Lough Guitane (W0185), 24 larvae 20 November 2002. Owenreagh River, bridge upstream of the Upper Lake (V8882), 4 larvae 24 June 2003. River Flesk, bridge near Glenflesk (W0685), 8 larvae 13 March 2003. All collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).
WICKLOW: River Slaney, Waterloo Bridge (S9093), 1 larva 29 November 2002, collected & determined C. Bradley (Kelly-Quinn *et al*., 2019).

***Triaenodes bicolor* (Curtis, 1834) (Fig. 88)**

MAYO: Ballycroy National Park (F8607), 1♀ 1-20 July 1997, Malaise trap on cutover blanket bog near the River Owenduff, M. C. D. Speight.

***Ylodes reuteri* (McLachlan, 1880)**

In 2018, three adults of the brackish water caddisfly *Ylodes reuteri* were light- trapped in a 125w MV Robinson moth-trap by T. Bryant during June and July at Tramore, County Waterford ((S5701), in south-east Ireland. These were the first Irish adults since 1902 and the third record of the species on the island (O'Connor and Bryant, 2018). In 2019, he light-trapped further adults at the same locality and these records are given here: 1♀ 3 August 2019, 1♀ 14 August 2019, 2♀♀ 25 August 2019, 2♀♀ 11 September 2019 and 1♀ 18 September 2019.

In Britain, the species has only been recorded in July (Barnard and Ross, 2012) but in Ireland, adults have been trapped from 7 June - 18 September.

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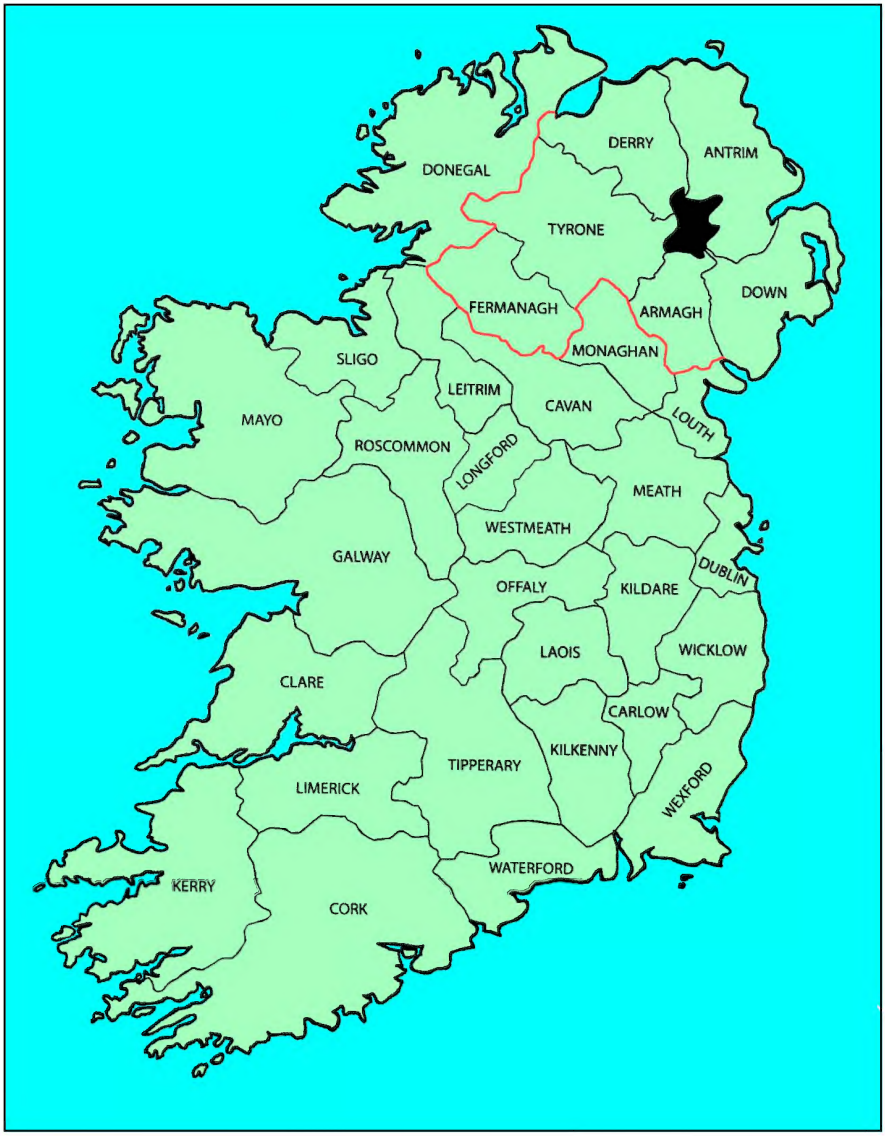
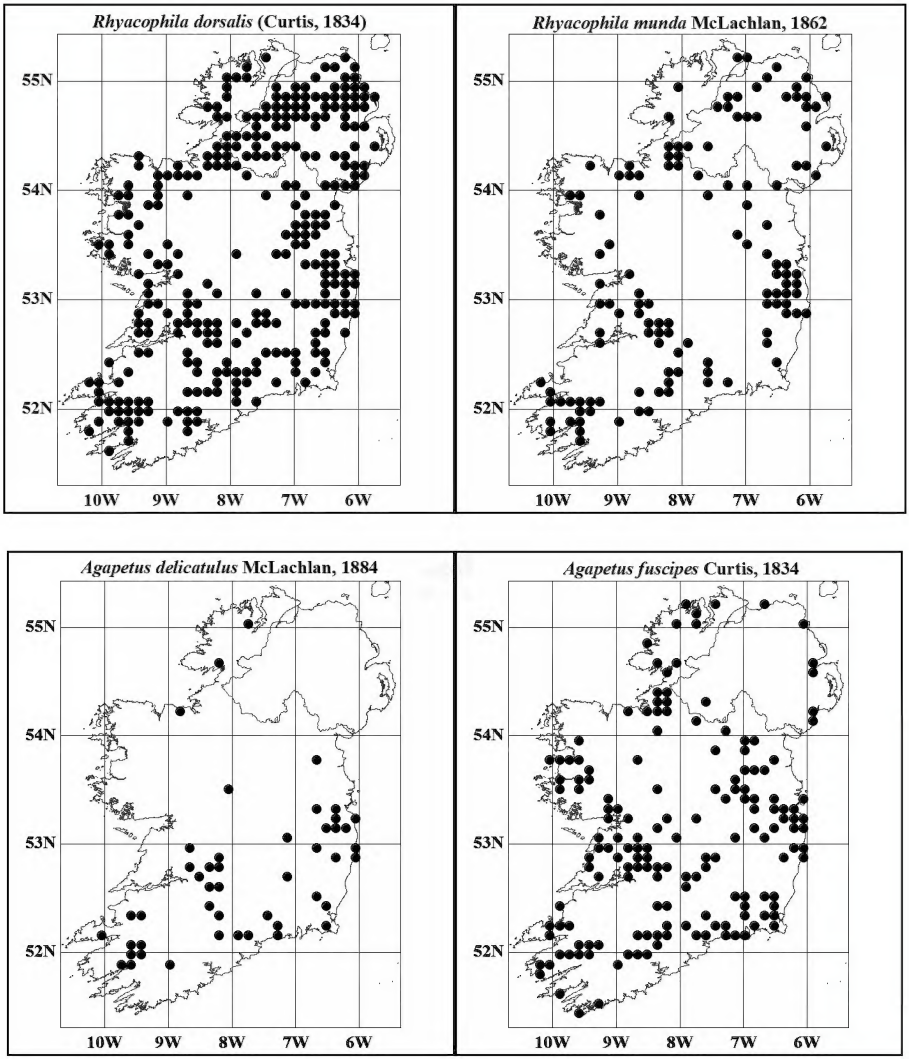
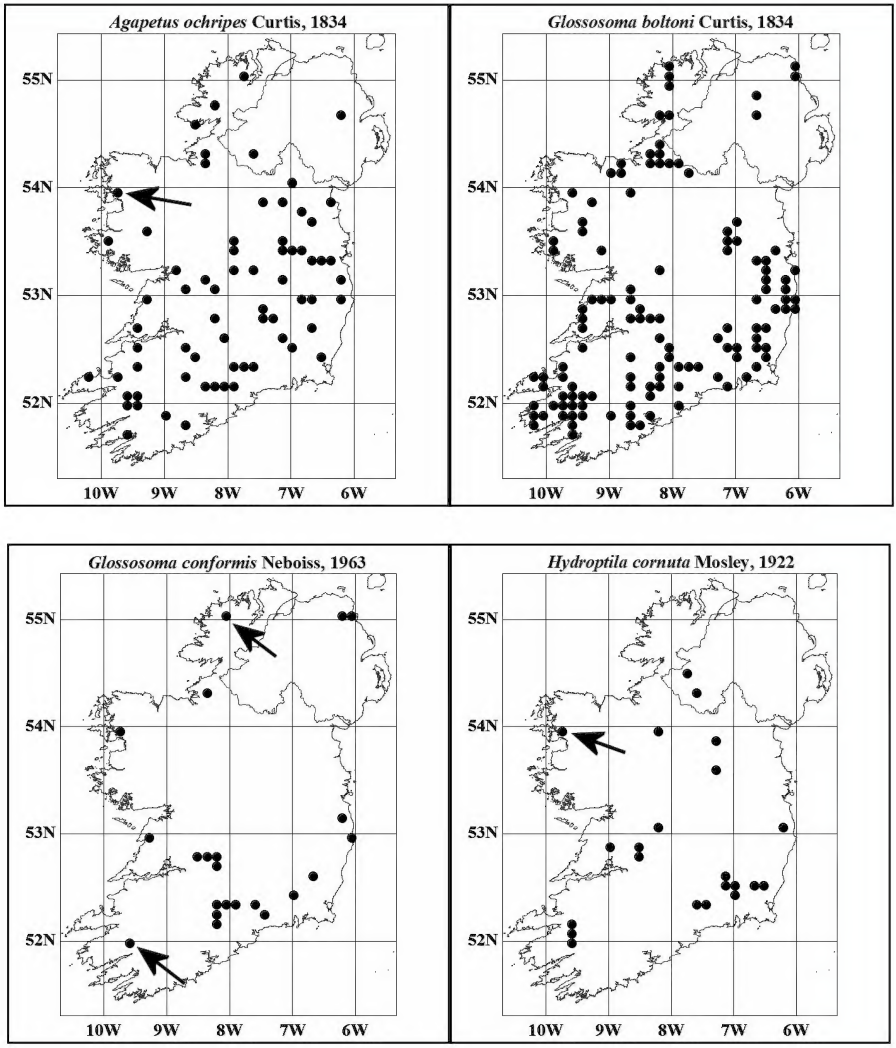


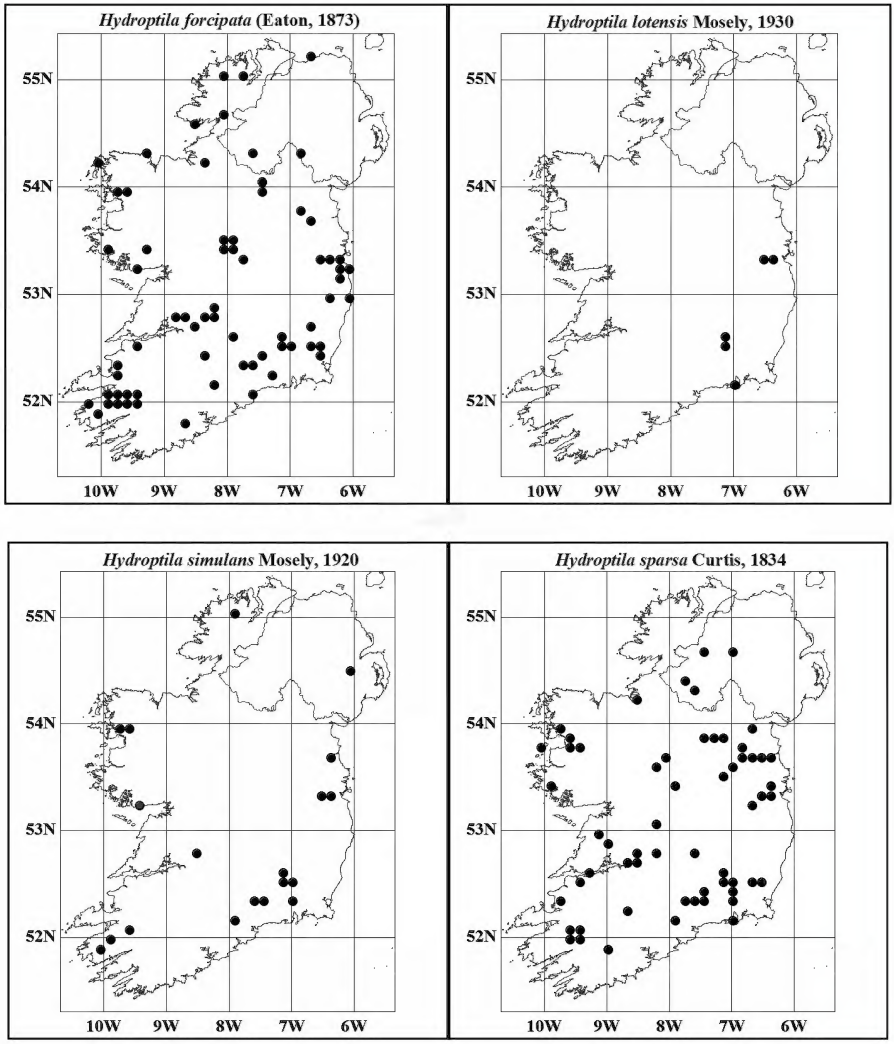
FIGURE 1. The counties of Ireland.



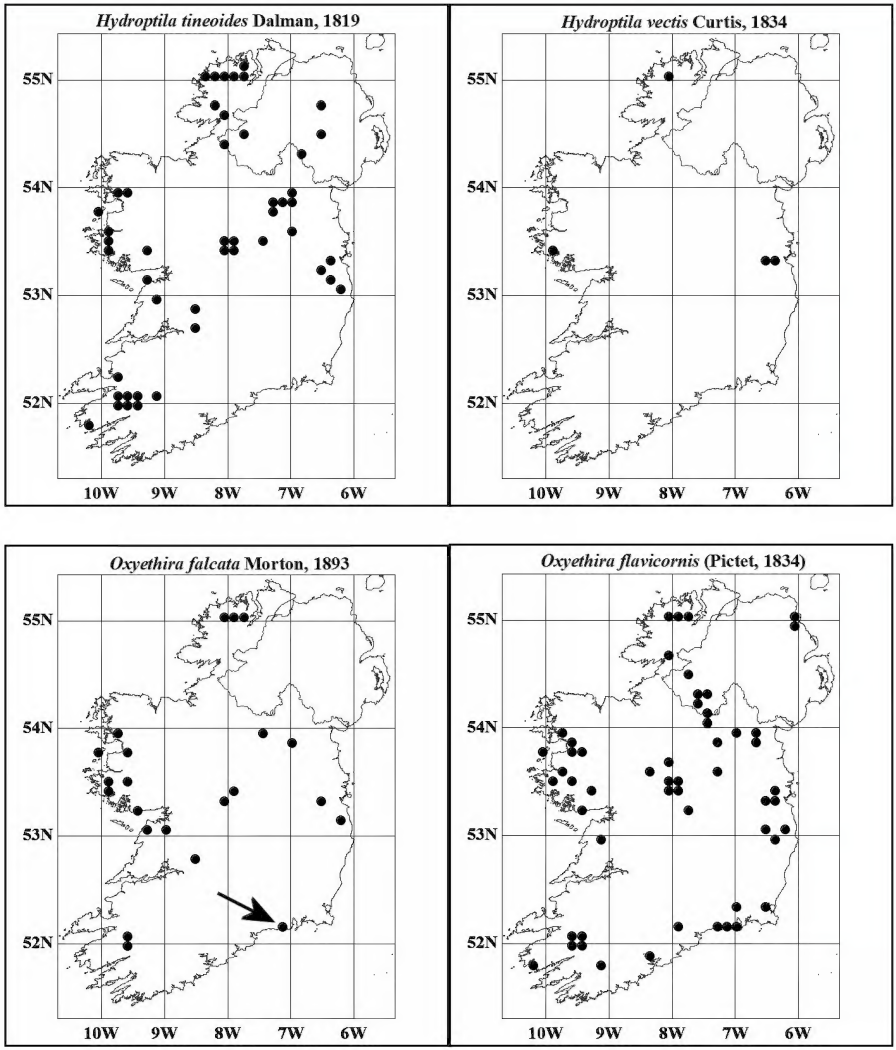
FIGURES 2-5. The known Irish distributions of *Rhyacophila dorsalis* (Curtis, 1834), *Rhyacophila munda* McLachlan, 1862, *Agapetus delicatulus* McLachlan, 1884 and *Agapetus fuscipes* Curtis, 1834.



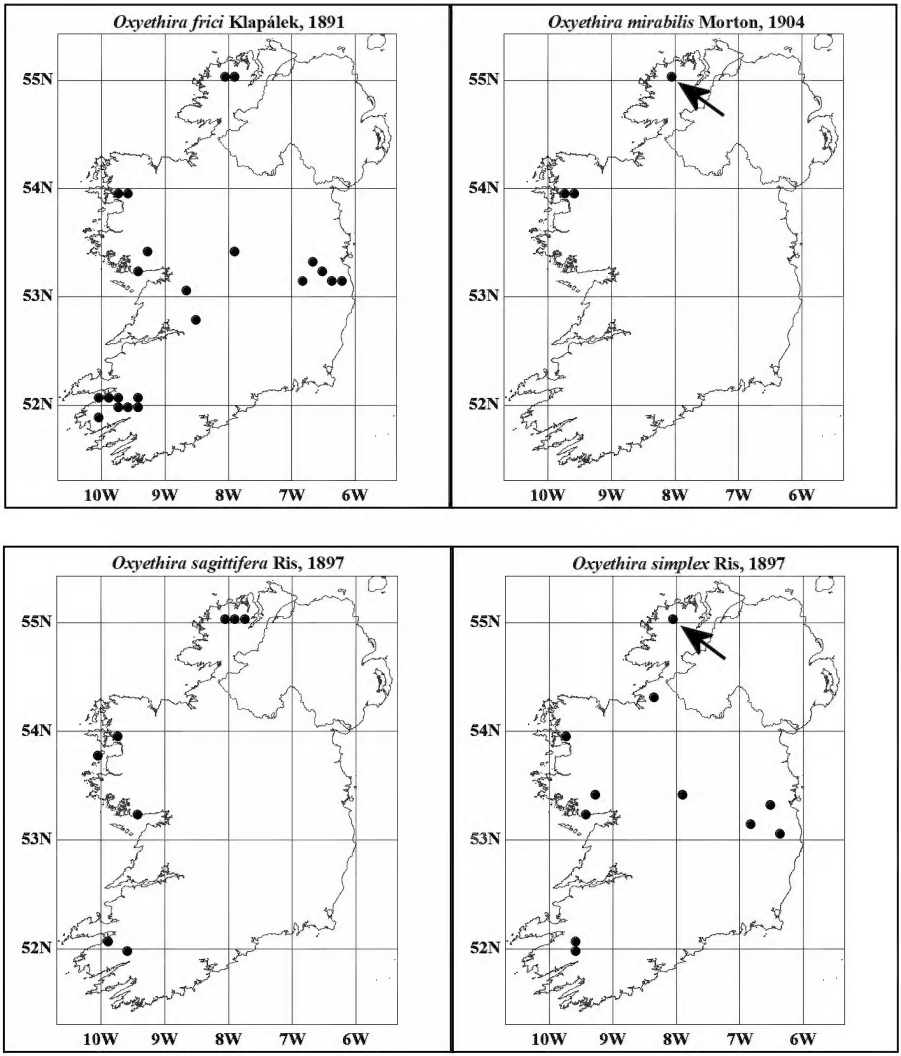
FIGURES 6-9. The known Irish distributions of *Agapetus ochripes* Curtis, 1834, *Glossosoma boltoni* Curtis, 1834, *Glossosoma conformis* Neboiss, 1963 and *Hydroptila cornuta* Mosley, 1922. Notable records are indicated by arrows.



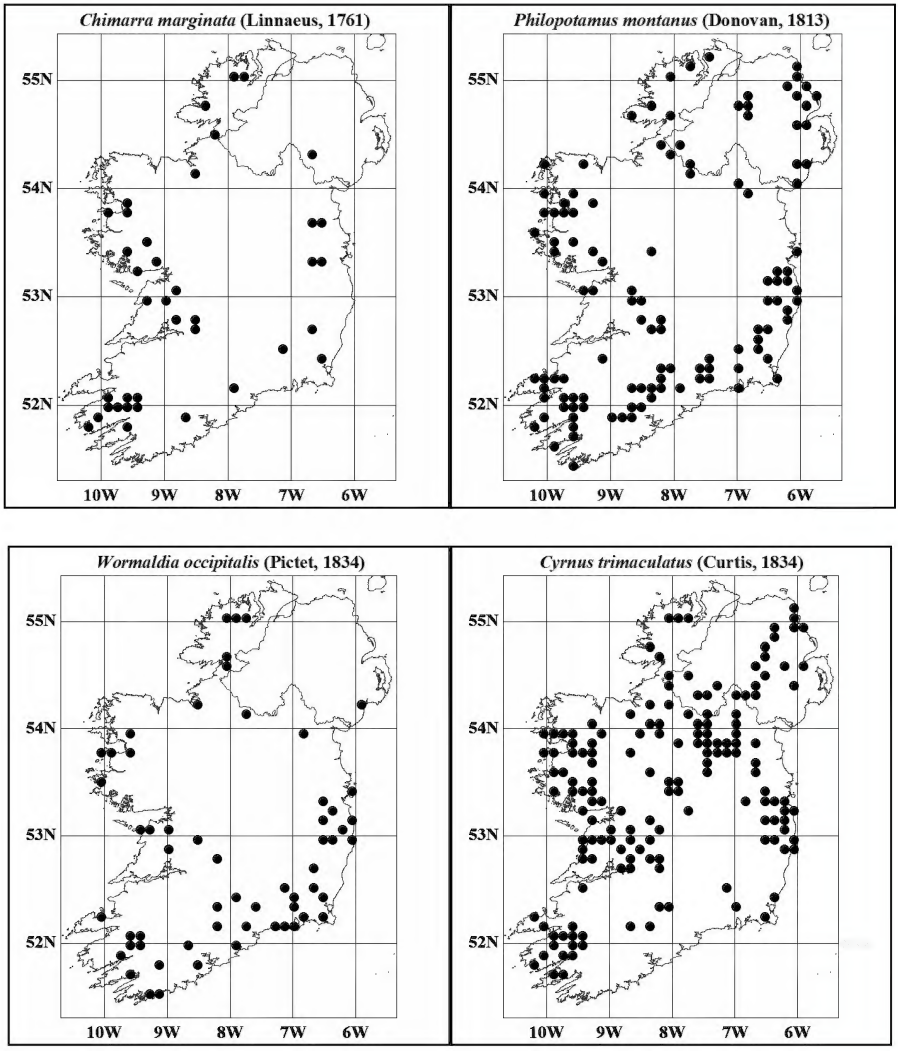
FIGURES 10-13. The known Irish distributions of *Hydroptila forcipata* (Eaton, 1873), *Hydroptila lotensis* Mosely, 1930, *Hydroptila simulans* Mosely, 1920 and *Hydroptila sparsa* Curtis, 1834.



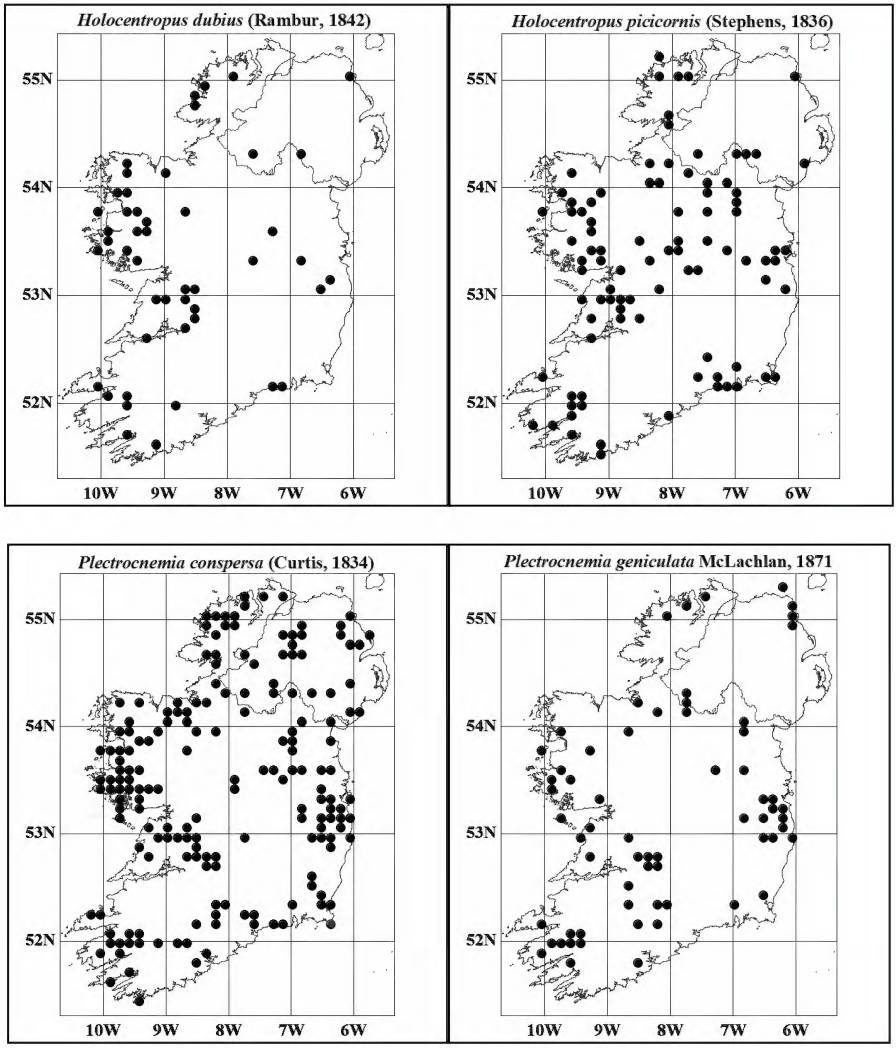
FIGURES 14-17. The known Irish distributions of *Hydroptila tineoides* Dalman, 1819, *Hydroptila vectis* Curtis, 1834, *Oxyethira falcata* Morton, 1893 and *Oxyethira flavicornis* (Pictet, 1834). A notable record is indicated by an arrow.



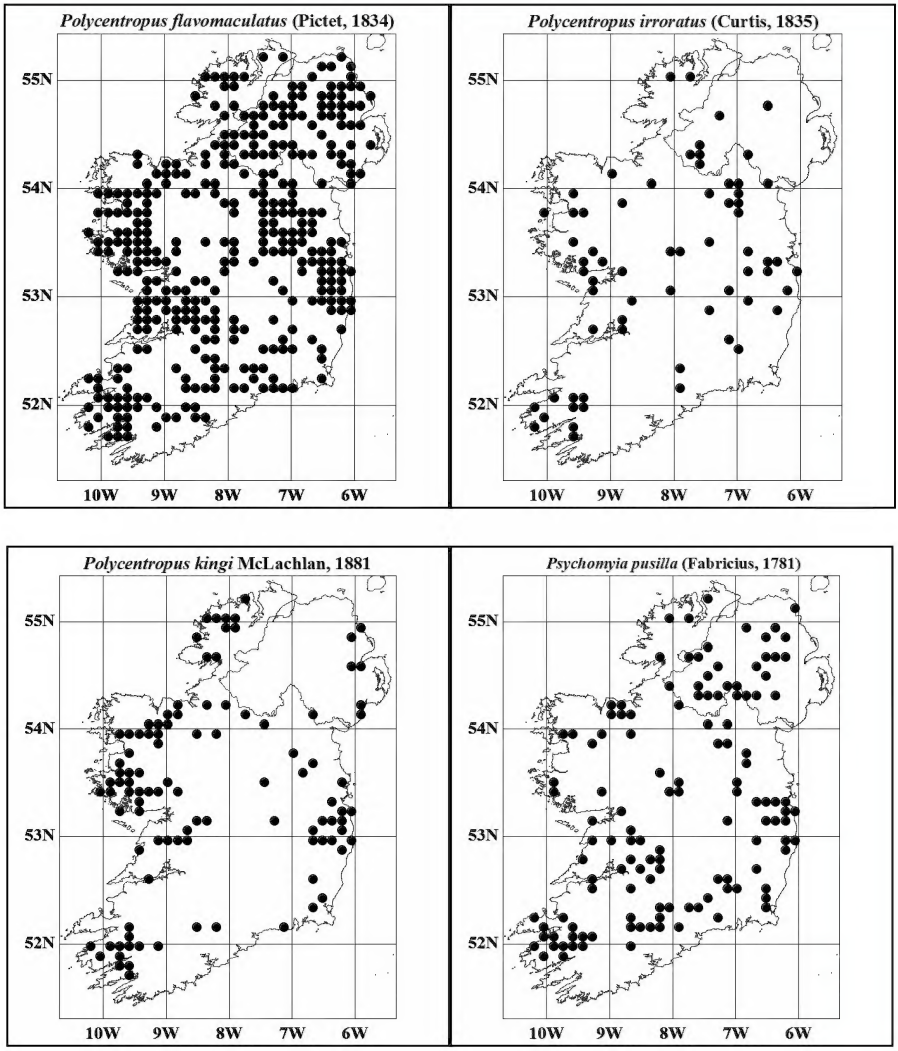
FIGURES 18-21. The known Irish distributions of *Oxyethira frici* Klapálek, 1891, *Oxyethira mirabilis* Morton, 1904, *Oxyethira sagittifera* Ris, 1897 and *Oxyethira simplex* Ris, 1897. Notable records are indicated by arrows.



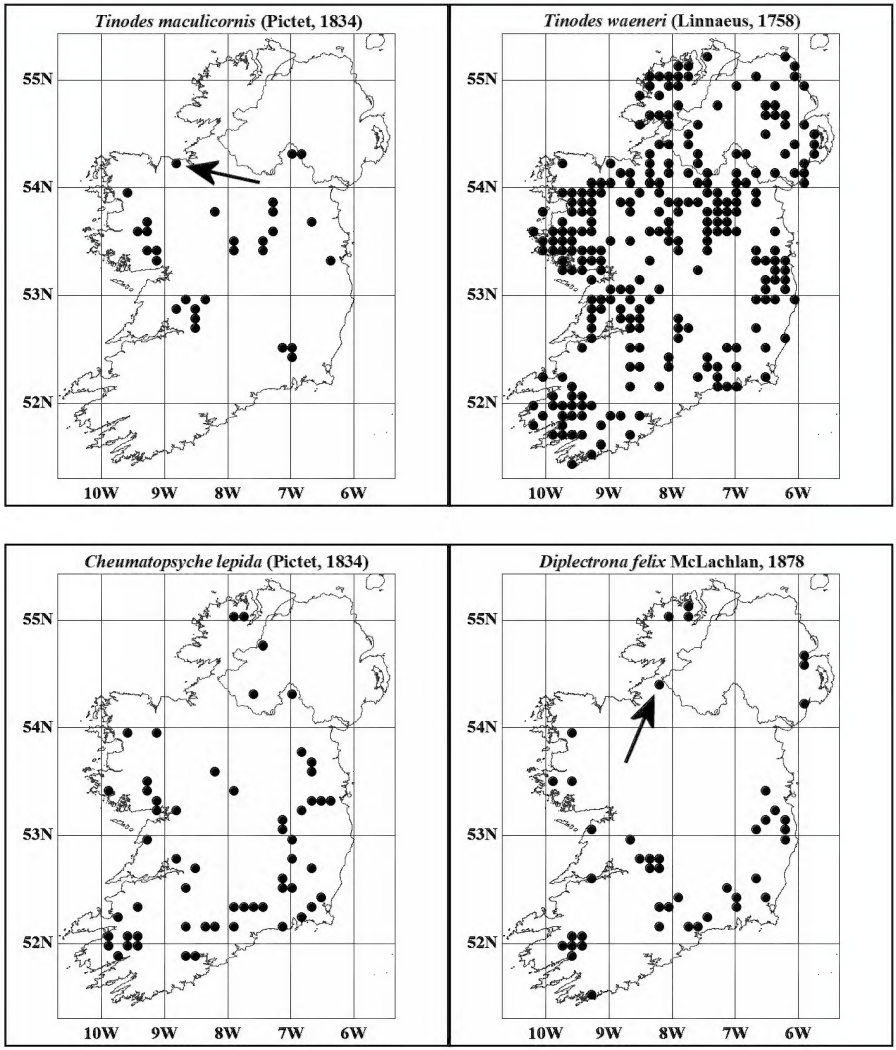
FIGURES 22-25. The known Irish distributions of *Chimarra marginata* (Linnaeus, 1761), *Philopotamus montanus* (Donovan, 1813), *Wormaldia occipitalis* (Pictet, 1834) and *Cyrnus trimaculatus* (Curtis, 1834).



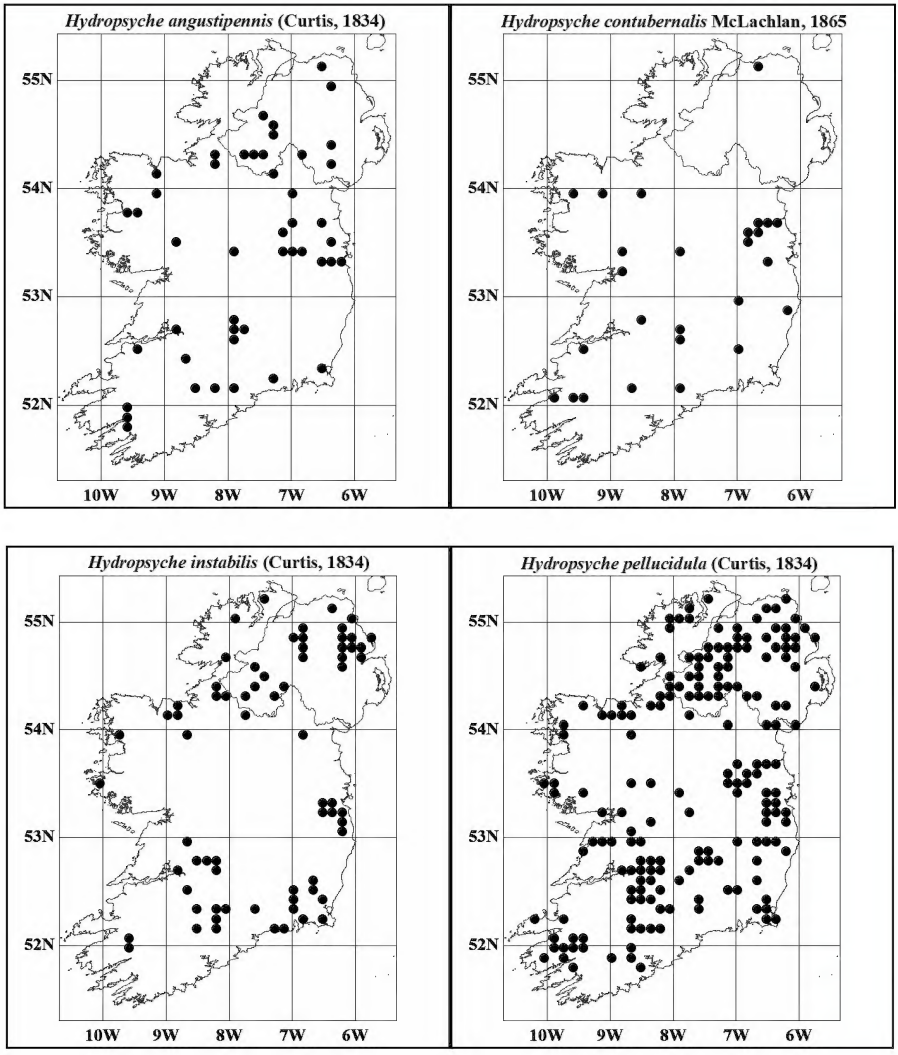
FIGURES 26-29. The known Irish distributions of *Holocentropus dubius* (Rambur, 1842), *Holocentropus picicornis* (Stephens, 1836), *Plectrocnemia conspersa* (Curtis, 1834) and *Plectrocnemia geniculata* McLachlan, 1871.



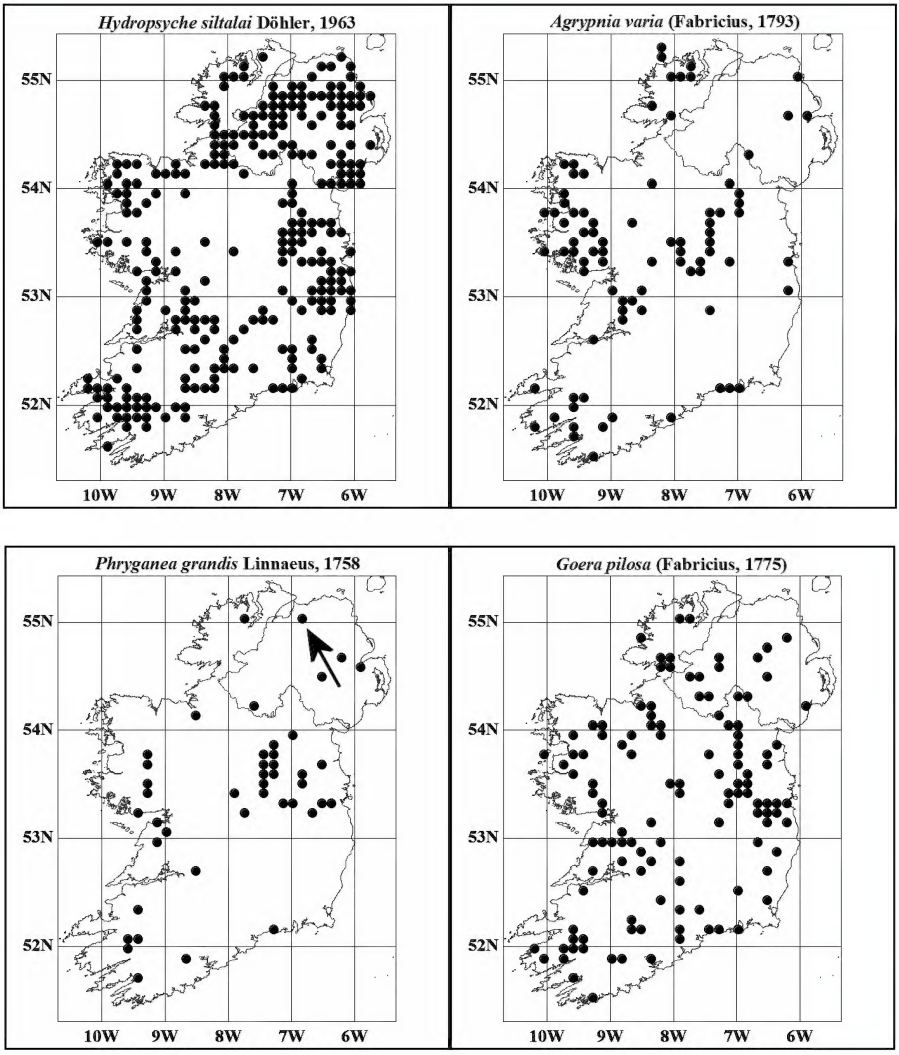
FIGURES 30-33. The known Irish distributions of *Polycentropus flavomaculatus* (Pictet, 1834), *Polycentropus irroratus* (Curtis, 1835), *Polycentropus kingi* McLachlan, 1881 and *Psychomyia pusilla* (Fabricius, 1781).



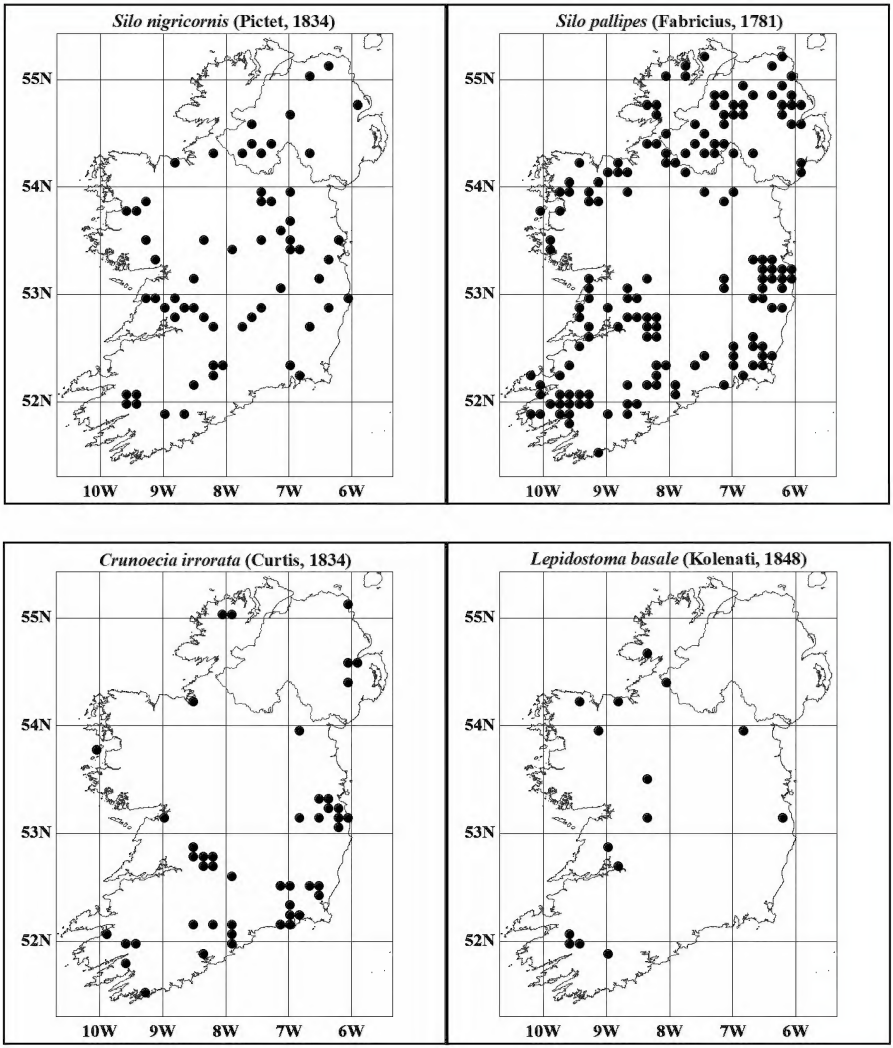
FIGURES 34-37. The known Irish distributions of *Tinodes maculicornis* (Pictet, 1834), *Tinodes waeneri* (Linnaeus, 1758), *Cheumatopsyche lepida* (Pictet, 1834) and *Diplectrona felix* McLachlan, 1878. Notable records are indicated by arrows.



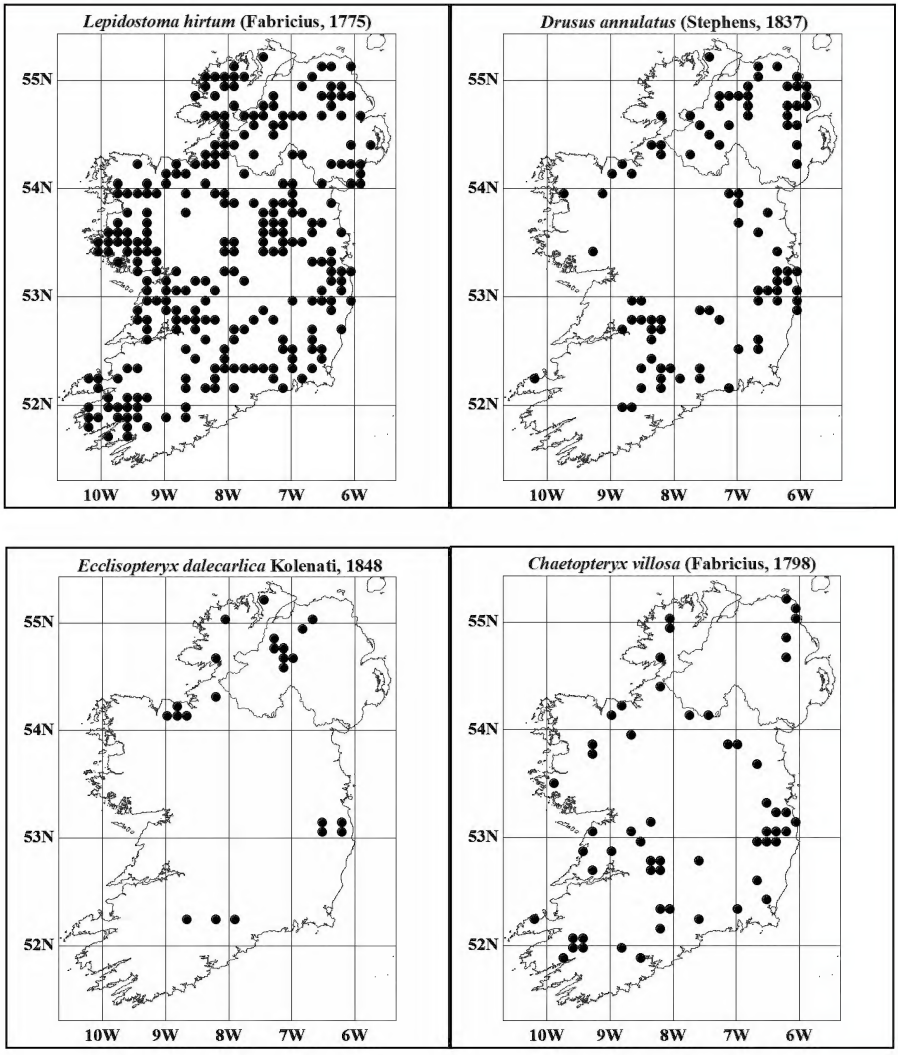
FIGURES 38-41. The known Irish distributions of *Hydropsyche angustipennis* (Curtis, 1834), *Hydropsyche contubernalis* McLachlan, 1865, *Hydropsyche instabilis* (Curtis, 1834) and *Hydropsyche pellucidula* (Curtis, 1834).



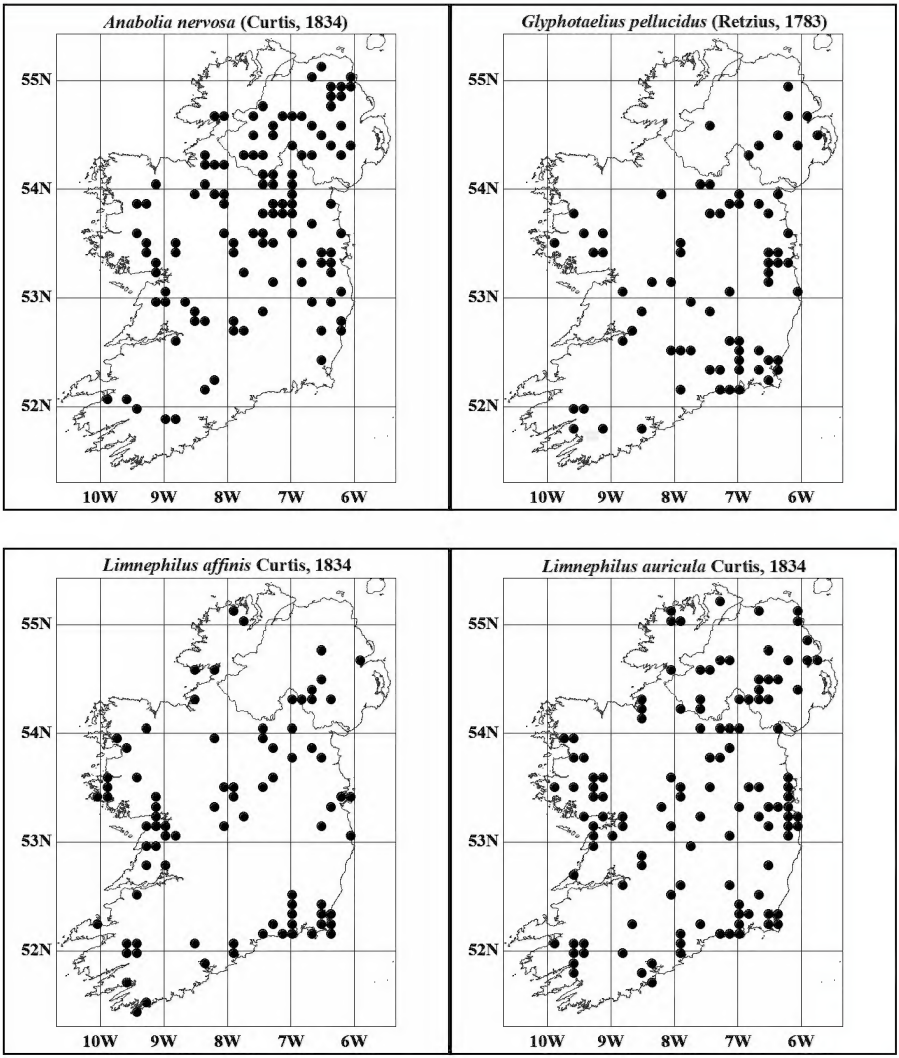
FIGURES 42-45. The known Irish distributions of *Hydropsyche siltalai* Döhler, 1963, *Agrypnia varia* (Fabricius, 1793), *Phryganea grandis* Linnaeus, 1758 and *Goera pilosa* (Fabricius, 1775). A notable record is indicated by an arrow.



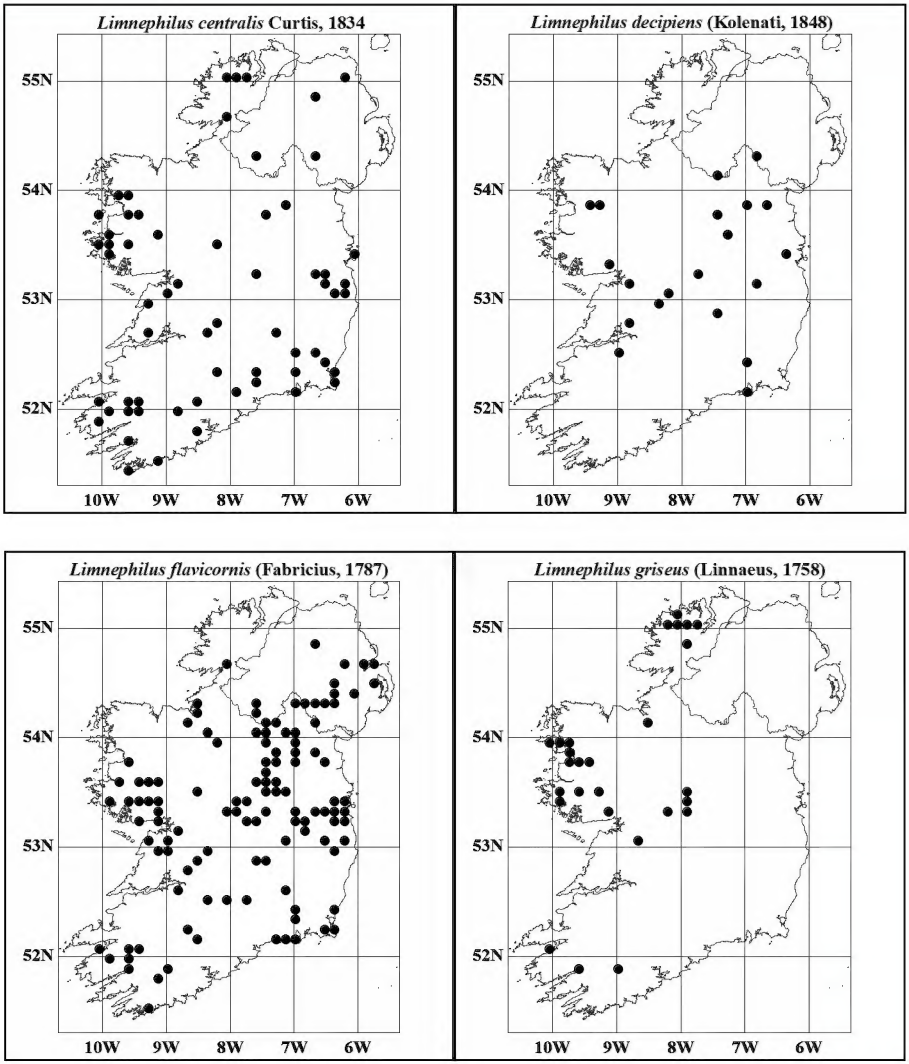
FIGURES 46-49. The known Irish distributions of *Silo nigricornis* (Pictet, 1834), *Silo pallipes* (Fabricius, 1781), *Crunoecia irrorata* (Curtis, 1834) and *Lepidostoma basale* (Kolenati, 1848).



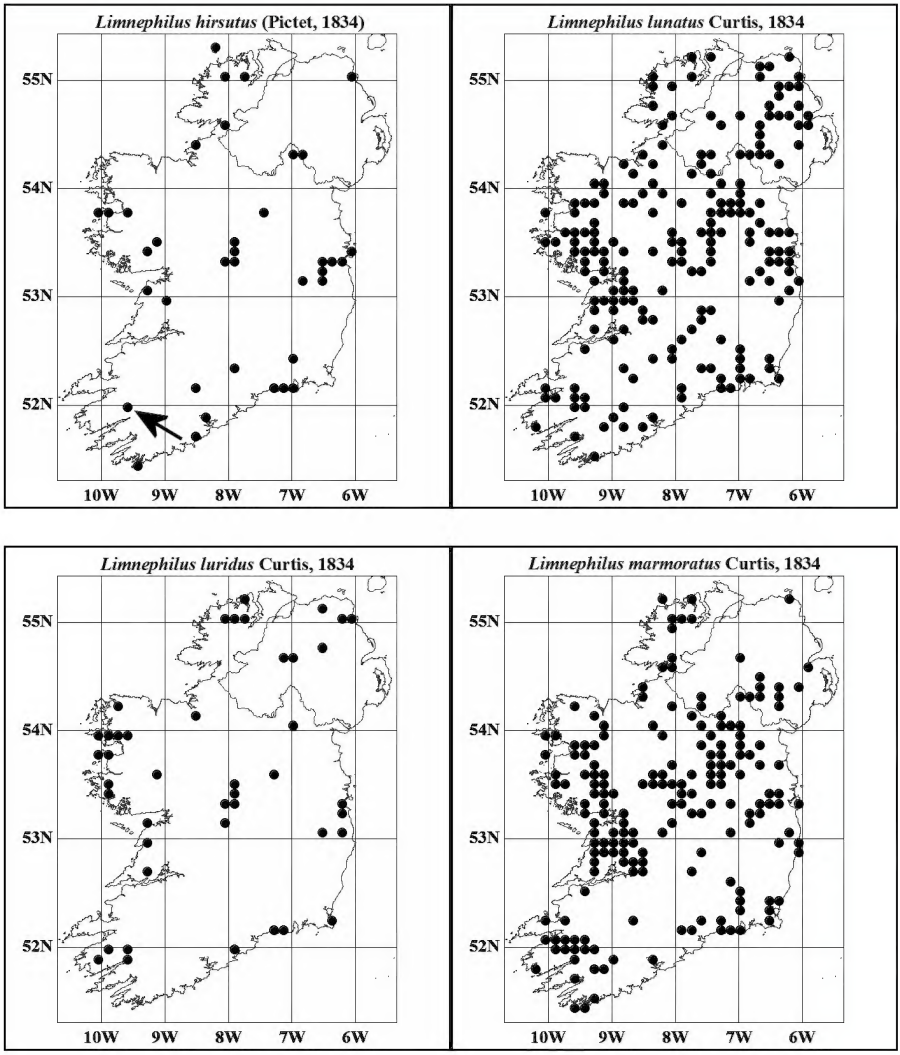
FIGURES 50-53. The known Irish distributions of *Lepidostoma hirtum* (Fabricius, 1775), *Drusus annulatus* (Stephens, 1837), *Ecclisopteryx dalecarlica* Kolenati, 1848 and *Chaetopteryx villosa* (Fabricius, 1798).



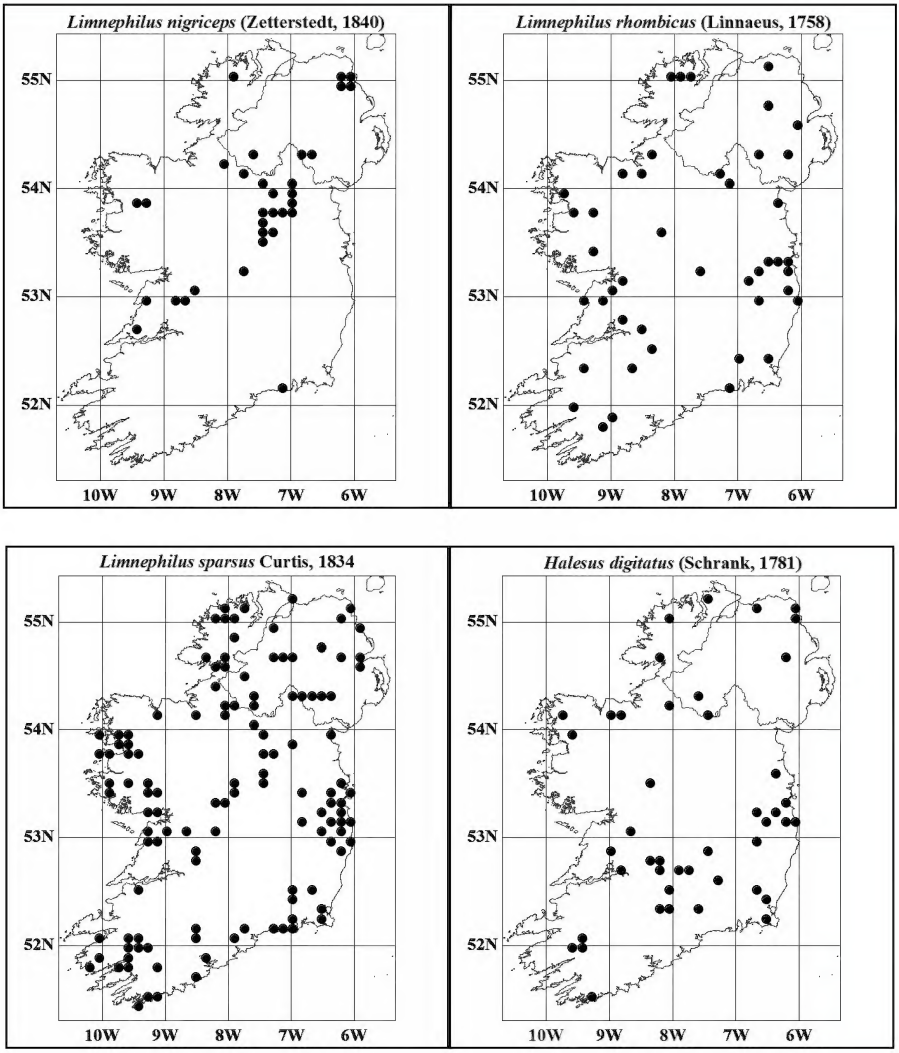
FIGURES 54-57. The known Irish distributions of *Anabolia nervosa* (Curtis, 1834), *Glyphotaelius pellucidus* (Retzius, 1783), *Limnephilus affinis* Curtis, 1834 and *Limnephilus auricula* Curtis, 1834.



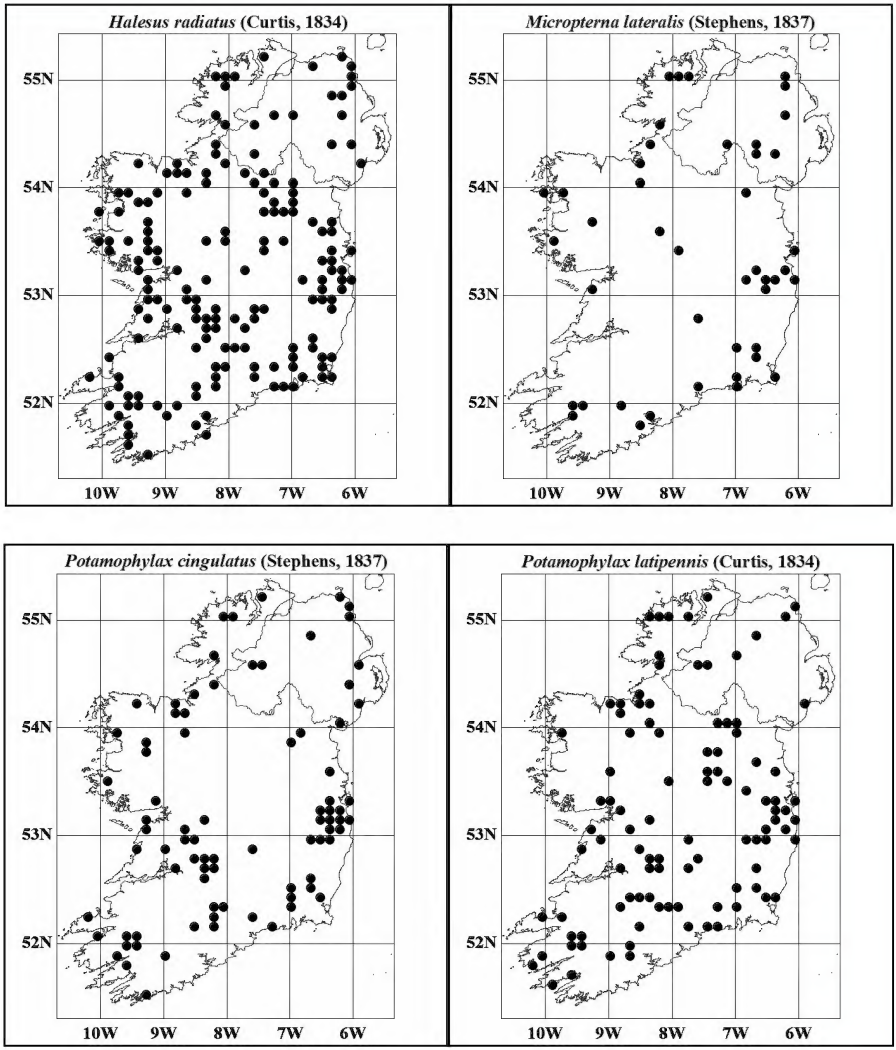
FIGURES 58-61. The known Irish distributions of *Limnephilus centralis* Curtis, 1834, *Limnephilus decipiens* (Kolenati, 1848), *Limnephilus flavicornis* (Fabricius, 1787) and *Limnephilus griseus* (Linnaeus, 1758).



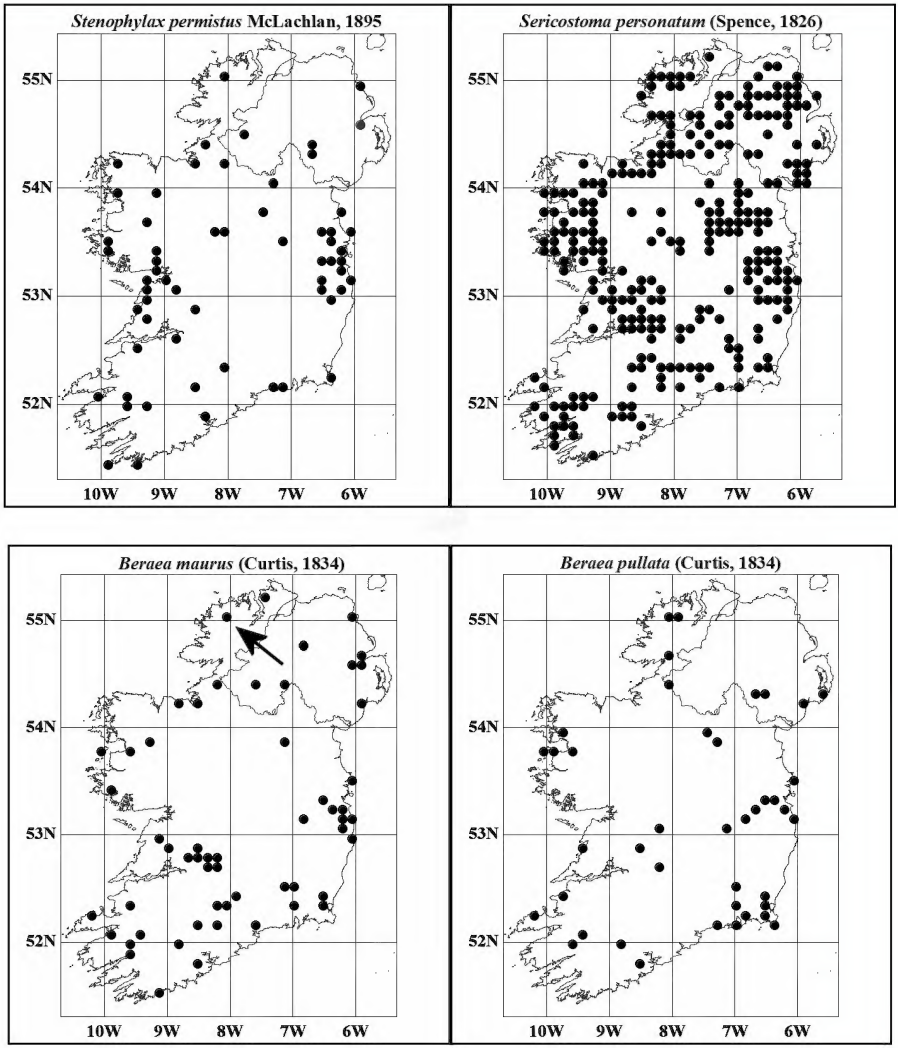
FIGURES 62-65. The known Irish distributions of *Limnephilus hirsutus* (Pictet, 1834), *Limnephilus lunatus* Curtis, 1834, *Limnephilus luridus* Curtis, 1834 and *Limnephilus marmoratus* Curtis, 1834. A notable record is indicated by an arrow.



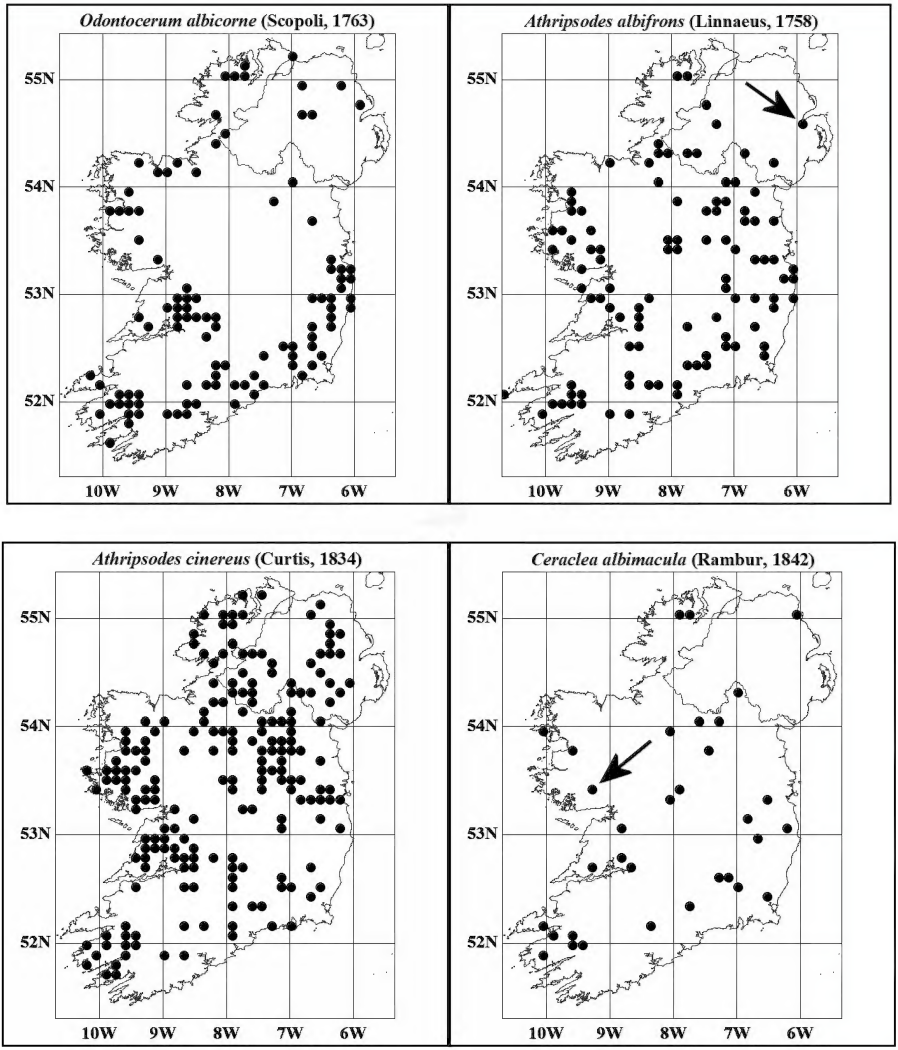
FIGURES 66-69. The known Irish distributions of *Limnephilus nigriceps* (Zetterstedt, 1840), *Limnephilus rhombicus* (Linnaeus, 1758), *Limnephilus sparsus* Curtis, 1834 and *Halesus digitatus* (Schrank, 1781).



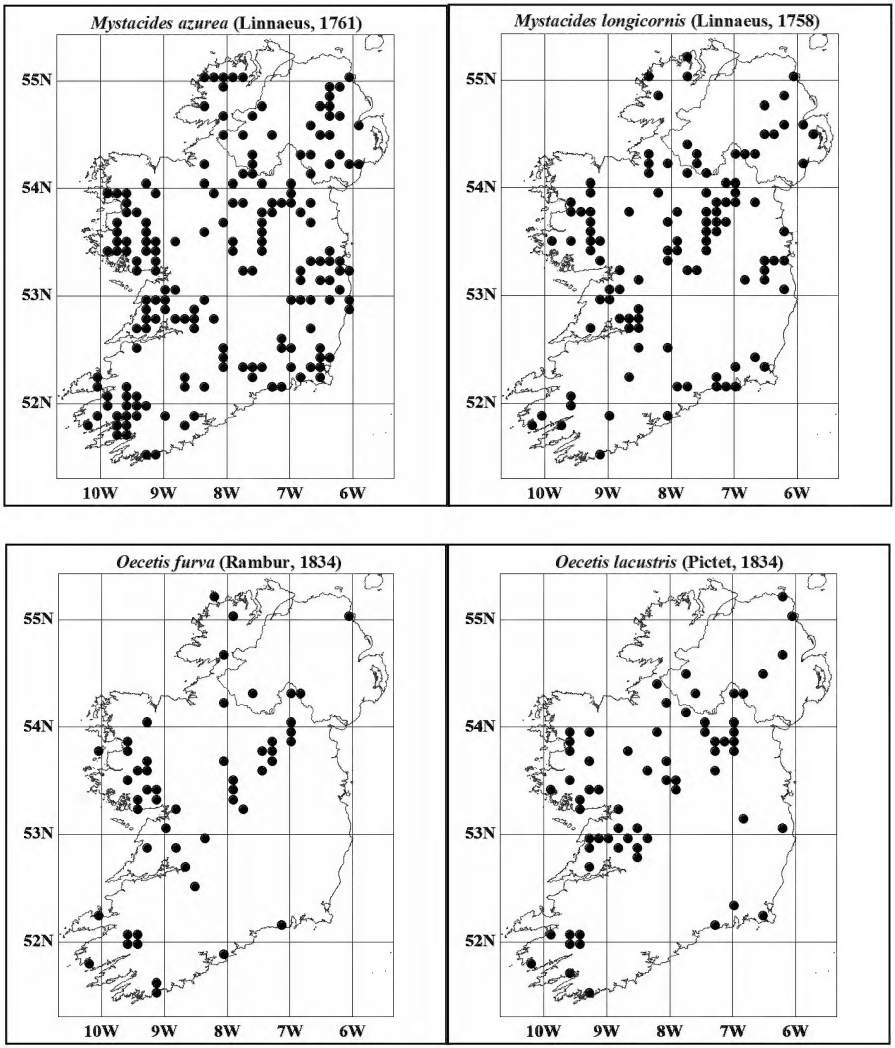
FIGURES 70-73. The known Irish distributions of *Halesus radiatus* (Curtis, 1834), *Micropterna lateralis* (Stephens, 1837), *Potamophylax cingulatus* (Stephens, 1837) and *Potamophylax latipennis* (Curtis, 1834).



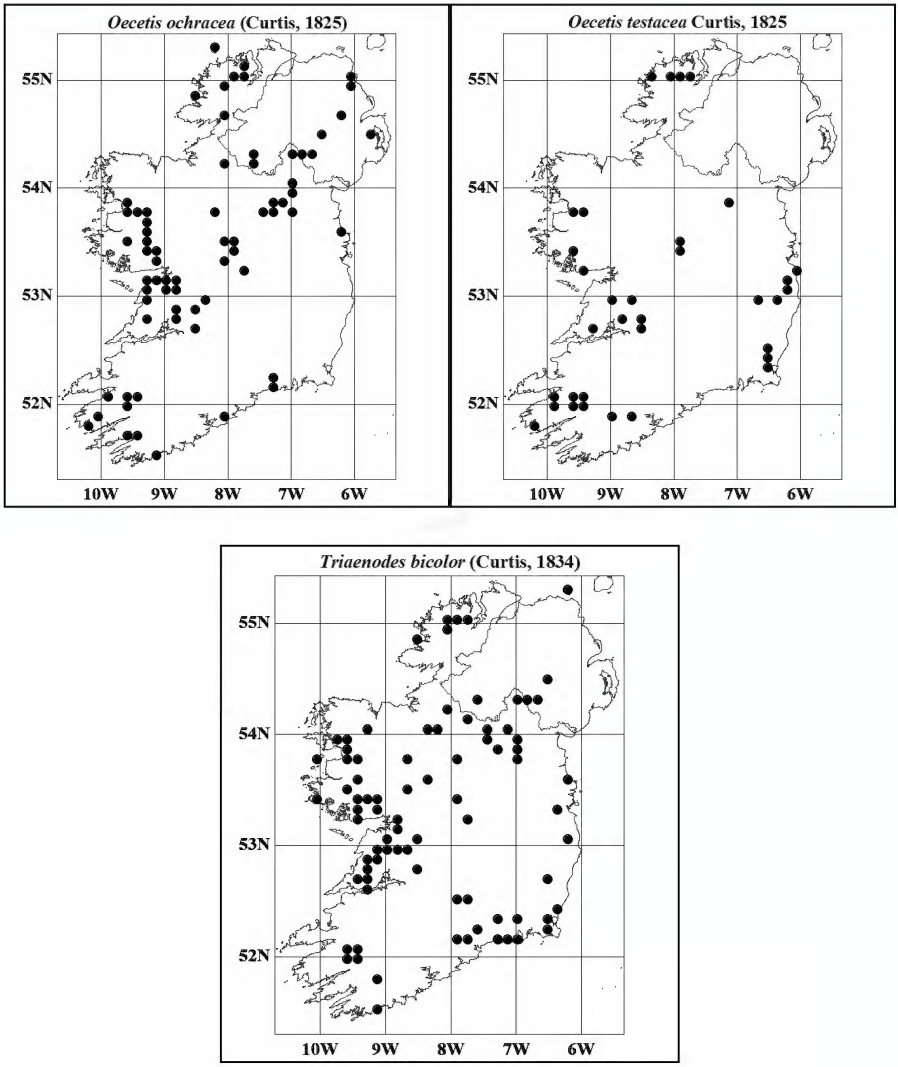
FIGURES 74-77. The known Irish distributions of *Stenophylax permistus* McLachlan, 1895, *Sericostoma personatum* (Spence, 1826), *Beraea maurus* (Curtis, 1834) and *Beraea pullata* (Curtis, 1834). A notable record is indicated by an arrow.



FIGURES 78-81. The known Irish distributions of *Odontocerum albicorne* (Scopoli, 1763), *Athripsodes albifrons* (Linnaeus, 1758), *Athripsodes cinereus* (Curtis, 1834) and *Ceraclea albimacula* (Rambur, 1842). Notable records are indicated by arrows.



FIGURES 82-85. The known Irish distributions of *Mystacides azurea* (Linnaeus, 1761), *Mystacides longicornis* (Linnaeus, 1758), *Oecetis furva* (Rambur, 1834) and *Oecetis lacustris* (Pictet, 1834).



FIGURES 86-88. The known Irish distributions of *Oecetis ochracea* (Curtis, 1825), *Oecetis testacea* Curtis, 1825 and *Triaenodes bicolor* (Curtis, 1834).

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THE WATER-STICK INSECT *RANATRA LINEARIS* (L.) (HEMIPTERA: NEPIDAE) NEW TO COUNTY WATERFORD, IRELAND

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Abstract

Adults of the water-stick insect *Ranatra linearis* (L.) (Hemiptera: Nepidae) were discovered in Belle Lake, County Waterford, south-east Ireland. These are the first confirmed records of adults from the island and it is the first time that the species has been reported from a natural habitat here, suggesting a long established and overlooked population.
Key words: *Ranatra linearis* (L.), Hemiptera, Nepidae, adults, Ireland, Waterford, Belle Lake, first confirmed adults, first natural habitat.

Introduction

The water-stick insect *Ranatra linearis* (L.) (Hemiptera: Nepidae) was first mentioned and illustrated as an Irish insect by Cabot (?1977) in his book *Irish Pond Life* but the author gave no details of any records. Publications in the Irish Environmental Library Series have provided reliable records of other insects species new to Ireland e.g. Goodhue (1980). Subsequently, Nelson (2018) reported the species from an artificial pond on the Wexford Wildlife Reserve on the 18 August 2016. Three immature specimens were caught with a pond net. No adults were found. The pond was created in 2005 and is currently used as an outdoor classroom and educational facility including for pond dipping. Nelson (*op. cit.*) suggests that the species may have appeared there between 2011 and 2016. An accidental introduction cannot be ruled out.

The present records

With some relaxation in the Irish covid-19 restrictions, AW was able to visit Belle Lake, County Waterford, to carry out essential work on the lake's facilities. While enjoying a break on the shore from ground maintenance, he noticed what looked like a reed in the lake but, unusually, it was moving in the water against the waves. Upon collecting the object, he recognised it as a water-stick insect. After the specimen was photographed (Plate 1), it was returned unharmed to the water and the National Biodiversity Data Centre was notified.

Subsequently on 25 May 2020, four adults were taken by him in a net during three kick samples along the stretch of shore-line between the Pump Station and the south-eastern reed bed.

The records

WATERFORD: Belle Lake (S6605), adult 21 May 2020, in the lake beside the eastern shore at the Pump Station, (S6605, S6604), four adults 25 May 2020, in three kick samples taken between the Pump Station and and the south-eastern reed bed, collected and determined A. Walshe, confirmed J. P. O'Connor.

The known 10km Irish distribution of *Ranatra linearis* is shown (Fig. 1).

Belle Lake

Belle Lake is a medium sized calcareous lake (35ha), with a maximum length of 1.3km, surrounded by agricultural land (pasture mostly). The maximum depth is 7.6m. The catchment is small. This is one of the few substantial areas of fresh water in the south-east of Ireland and, as such, is of regional importance being a Proposed Natural Heritage Area. It is presently looked after by the Belle Lake Trust CLG, a non-profit organisation. The Trust's mission is to provide support to the stewardship and sustainable development of the lake. This is important as the lake has an interesting aquatic fauna. For example, the very rare Irish caddisfly *Cyrnus insolutus* McLachlan, 1878 was recently recorded from Belle Lake (O'Connor and O'Connor, 2016). Elsewhere in Ireland, it is only known from Lough Derrygeeha, County Clare (O'Connor, 1977, 2015). The lake also provided the first record of the caddisfly *Limnephilus decipiens* (Kolenati, 1848) from south-east Ireland (O'Connor and Walshe, 2018).

In recent years, the water quality of the lake has improved from moderate to good but the nutrient levels remain high (Anon, 2013). The south end of the lake is shallow and the gently sloping bottom consists here of woody fen peat. At the northern end, the substrate is rocky in the shallows and the shore slopes steeply. In the deeper water, the bottom consists of silty, sandy mud. The south end was an extensive marsh which has now been partly drained and planted with conifers but there is still a large marsh adjoining part of the west side of the lake (Green, 2008) (Plate 2).

A detailed study of the vegetation of Belle Lake was carried out by Heuff (1984) and the plant information is taken from that work. The lake contains a high diversity of vegetation types. An up to 10m wide *Phragmites* reed fringe surrounds most of the lake, with an extensive *Phragmites* swamp still occurring at the south/south-west end. The *Phragmites* fringe is replaced by *Typha angustifolia* in one large area and it is at least 15m wide. On the landside of the reed fringe are present a zone of *Eleocharis palustris* and in patches *Carex rostrata* and *Menyanthes trifoliata*. The reed fringe is fronted by *Scirpus lacustris*. On the stony northern shore, the reed zone is much reduced or absent.

Discussion

These new records of *Ranatra linearis* from Belle Lake are significant. The adults are the first confirmed ones from Ireland. It is also first time that the species has been reported from a natural habitat in Ireland, suggesting a long established and overlooked population. Since the lake has extensive reed beds (Plate 3), these provide a perfect environment as the species frequents aquatic habitats where thick emergent plants with erect stems are almost always available. The bug spends much of its time immobile within the vegetation, which it protectively resembles, awaiting swimming prey (Southwood and Leston, 1959).

The timing of the discovery is fortunate as the water-stick insect can be difficult to find in reed beds. Overwintered adults mate in April and eggs are laid in row on the stems and leaves of water plants. However, the oviposition season is protracted to July (Southwood and Leston, *op. cit.*). The first Belle Lake individual may therefore have been female from a nearby established reed bed seeking a new one in which to lay her eggs. *R. linearis* swims using the mid and hind legs as oars (Anon., 2020). Since the species can also fly, it may yet be found in other suitable habitats in south-east Ireland.

Acknowledgements

We wish to thank Dr Peter Foss of Foss Environmental Consulting for providing the photograph of Belle Lake. The distribution map was prepared using DMAP and the authors are indebted to Dr Alan Morton for supplying the relevant software. We are grateful to the referee for constructive remarks on the ms.

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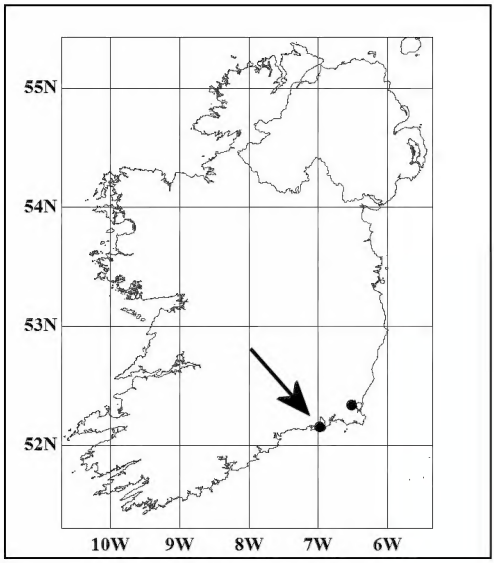

FIGURE 1. The known 10km Irish distribution of *Ranatra linearis*. An arrow indicates the location of the new records.

PLATE 1. *Ranatra linearis*, 21 May 2020, Belle Lake, County Waterford. Photograph © Alan Walshe.

PLATE 2. Belle Lake, County Waterford. Photograph © Google. 1 = Pump Station. 2 = start of the south-eastern reed bed.

PLATE 3. South/south-western end of Belle Lake, County Waterford. Photograph © Peter Foss.

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FIRST RECORDS OF PERSIAN WALNUTS *JUGLANS REGIA* L. (JUGLANDACEAE: CARDIOCARYON) STRANDED ON THE IRISH COAST AND A REVIEW OF NORTH ATLANTIC RECORDS

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Abstract

On 13 September 2017, LMN discovered an intact Persian Walnut *Juglans regia* L. measuring 39mm total length and 30mm maximum diameter stranded on Fanore Beach, Fanore Mor, County Clare (53.119653°N 9.288190°W), on the Atlantic coast of western Ireland. On 9 March 2019, LMN discovered another intact specimen of *J. regia* measuring 41mm total length and 29mm maximum diameter stranded at Goilin, Carrowntedaun, Lahinch, County Clare (53.119959°N, 9.288165°W). The specimens represent the first known records of stranded *J. regia* walnuts from Irish maritime shores. The occurrence and possible provenance of stranded *J. regia* walnuts on Irish and other North Atlantic maritime shores is reviewed.

Key words: Persian Walnut, *Juglans regia*, stranded walnuts, Irish and NW European waters.

Introduction

The Persian Walnut (*Juglans regia* L.) is one of the most economically important trees cultivated worldwide, primarily for its nutritious nuts and high-quality hard-wood timber (Boriss *et al*., 2006; Taha and Al-Wadaan, 2011; Smith, 2020). During 2018, total global production of in-shell walnuts amounted to 3.66 million tonnes. Although 53 countries contributed to total world production, the top five accounted for 81.5%: *viz.* China (43.3%), U.S.A. (16.7%), Iran (11.2%), Turkey (5.9%) and Mexico (4.4%) <http://www.fao.org/faostat/en/ #search/walnut>. California accounts for 99% of the U.S.A.'s *J. regia* walnut production, centred in the Sacramento and San Joaquin valleys (Hartshorn, 1999; Boriss *et al*., 2006; Bernard *et al*., 2018). The main production states in Mexico include Chihuahua, Sonora, Coahuila, Durango and Nuevo Leon.

It is generally accepted that after the last glaciation, *J. regia* survived in almost completely isolated stands in central Asia (Aradhya *et al*., 2007; Dong *et al*., 2017; Mu *et al*., 2017; Vischi *et al*., 2017; Bai *et al.,* 2018; Zhang *et al*., 2019; Song *et al*., 2020), and that ancient humans subsequently dispersed the species both eastwards across Asia and westwards to Europe *via* trade and cultural expansion (Pollegioni *et al*., 2014, 2015, 2017).

J. regia was introduced to the U.K. during the late 1600s (Kerr, 1993; Hemery *et al*., 2005; Johnson and More, 2006), and to the Americas by Spanish missionaries during the late 1700s, where it thrives in sub-tropical regions of Chile and California (Tomás, 2000). One of the oldest walnut trees in Ireland, a massive specimen of *J. regia* growing in the grounds of Saint Mary's Priory, Tallaght, Dublin, where it is colloquially known as Saint Maelruan's Tree, is thought to have been planted around 1760. Although the tree was struck by lightning during 1795 and split into several parts, it survived, and after 260 years still produces nuts in abundance (Zucchelli, 2016) (Plates 1-3). Several varieties, cultivars and hybrids of *J. regia* are well established under ambient conditions in the National Botanic Gardens in Dublin (Anon, 2017).

The Persian Walnut is a large long-lived monoecious tree, reaching a maximum height and crown width of 35m and 900m^2 respectively, a trunk diameter and circumference of up to 3m and 11.5m respectively, and a deep rooting system extending down to 6–7m and 12m laterally, characteristics which impart significant drought and stress tolerance. Walnut trees grow primarily in a humid temperate climate so that those found in tropical latitudes are restricted to rather high altitudes with good rainfall, while those found in arid regions are restricted to the canyons of streams (Manning, 1957; Wani *et al*., 2014, 2016).

The fruit is drupe-like and spherical, with a green, dehiscent pericarp (husk), which releases a single nut (endocarp) when mature. The hard light brown oblong nut, round in cross section, is covered with shallow irregular grooves, and measures 30-50mm in length and 25-30mm in width; the apex is short and minute-pointed, and the base flat or tapered. The nut contains an edible kernel (seed) covered with a thin, yellow to brown papery layer (pellicle) (Gunn and Dennis, 1999; Molnar *et al*., 2011).

Persian Walnuts *Juglans regia* stranded on Irish and NW European maritime shores

On 13 September 2017, LMN discovered an intact Persian Walnut *Juglans regia* L. measuring 39mm total length and 30mm maximum diameter stranded on Fanore Beach, Fanore Mor, County Clare (53.119653°N 9.288190°W), on the Atlantic coast of western Ireland. On 9 March 2019, LMN discovered another intact specimen of *J. regia* measuring 41mm total length and 29mm maximum diameter stranded at Goilin, Carrowntedaun, Lahinch, County Clare (53.119959°N, 9.288165°W) (Plates 4-5). The current specimens represent the first known records of *J. regia* walnuts stranded on Irish maritime shores. The occurrence and possible provenance of stranded *J. regia* walnuts on Irish and other North Atlantic maritime shores is reviewed.

Discussion

Although Persian Walnuts are generally thought to be naturally dispersed by gravity and animals (Ridley, 1930; Grimshaw, 2003; Van der Ham, 2012), and for millennia by humans (Pollegioni *et al*., 2014, 2015, 2017), they usually have good floatation properties, and some may also be dispersed by water (hydrochory). However, hydrochorously dispersed walnuts are unlikely to be viable because they are not completely waterproof; the sutures between the two halves of the nut eventually allow the penetration of both fresh and salt water, thus killing the seed (Gunn, 1968). Nevertheless, during flood conditions, some walnuts are inevitably carried down rivers and out to sea where they drift in ocean currents for various periods of time before either sinking or stranding.

The maximum reported floatation period for *J. regia* walnuts under test conditions in sea water is 15 months (Gunn and Dennis, 1999; Nelson 2000; Perry and Dennis, 2010). Although it is generally considered that stranded *J. regia* walnuts were probably discarded locally, considering the estimated time interval for passive eastward long-range dispersal of drift objects from south-eastern U.S.A. to Western Europe, ranging from at least 14 to 18 months (Quigley *et al*., 2016), and the long-term potential floatation properties of *J. regia* walnuts (15 months), it is conceivable that some specimens could have originated somewhere along the eastern coast of North America, and passively drifted *via* the Gulf Stream and North Atlantic Drift to western Ireland and/or other NW European shores.

In the NW Atlantic, *J. regia* walnuts are not uncommonly found stranded on maritime beaches in the Gulf of Mexico, including the Yucatan Peninsula (Mexico), Texas, and south-eastern Florida (Gunn, 1968; Gunn and Dennis, 1999; Gunn *et al*., 1984; Sullivan, 2004; Perry and Dennis, 2010). Stranded *J. regia* walnuts have also been reported from California, on the Pacific coast of the U.S.A. (Ebbesmeyer, 1977).

In the NE Atlantic, stranded *J. regia* walnuts are commonly found along the Dutch coast but are generally considered to be either of local origin or discarded imported walnuts (Brochard and Cadée, 2005; Van der Ham *et al*., 2013). Cadée (1996, 1997) discussed the human factors and palaeontological implications that need to be considered when interpreting the potential provenance of stranded non-native drift seeds. Stranded 'walnuts' were reported from the Norwegian coast during the early 1880s, but Alm (2003) considered that these may have been stranded tropical Sea Hearts (*Entada gigas* L.).

Paul Gainey (pers. comm.) remarked that over the years he had spotted at least five *J. regia* walnuts stranded on the north coast of Cornwall (U.K.), mostly from Perranporth and at least one from Gwithian Sands. He also related that over the last 5-6 years Chris Easton had seen three specimens at Perranporth, most recently during June-July 2020. Over the same period, Tracey Williams recorded a stranded specimen near Newquay. On 13 March 2019, Terena

Hillary discovered two specimens stranded at Perranporth, along with several tropical seeds, including two Grey Nickar Nuts (*Guilandina bonduc* L.), one Horse-Eye Bean (*Mucuna* sp.), and two Morning Glory (*Ipomoea*-type) seeds. On 21 March 2019, Terena Hillary recorded another stranded specimen of *J. regia* at Perranporth, along with three *G. bonduc*, one *Mucuna* sp., two *Ipomoea*-type seeds, three *E. gigas*, one Starnut (*Astrocaryium* sp.), and one Violet Sea Snail (*Janthina janthina* (L.)). The stranding of three *J. regia* walnuts in Cornwall and another in County Clare over a two week period during March 2019 suggests that these four walnuts may have arrived in U.K. and Irish waters around the same time. The co-occurrence of several species of tropical drift seeds along with three *J. regia* walnuts in Cornwall during March 2019 strongly suggests that all of these disseminules may have originated from the same general region in the western tropical Atlantic.

Despite several years of regular beachcombing along the County Clare coast, LMN has only recently found two specimens of stranded *J. regia* walnuts. Similarly, Rosemary Hill and Sabine Springer (pers. comm.) have never found any stranded specimens either in the southwest (County Kerry) or on the north coast of County Clare respectively. Dan Minchin (pers. comm.) recalled having occasionally found stranded *J. regia* walnuts on the Irish coast during the 1990s. Although the dearth of published records from the Irish, U.K. and other NW European countries may be related to a lack of recording effort, it is more likely due the perception (possibly erroneous), that all stranded *J. regia* walnuts were locally discarded.

Although it is possible that genetic analyses may reveal the origin of stranded walnuts, they are unlikely to explain the mechanisms as to how they arrived on maritime shorelines, perhaps several thousand miles from where they were originally growing. Considering the widespread cultivation and international trade in *J. regia*, it is possible that stranded *J. regia* walnuts could be derived from many different regions in either the Old or New World. However, considering their long-term flotation properties, it is possible that some walnuts stranded on NW European shores may represents true trans-Atlantic drifters, most likely from the Atlantic coast of Mexico, the world's fifth largest producer of *J. regia* walnuts. If genetic techniques revealed that the Fanore walnuts were of Mexican origin, it might lend some support to the peregrine hypothesis, but they still may have been imported into Ireland from Mexico and discarded locally.

At least twenty two extant species of walnut (*Juglans*) are currently recognised worldwide <www.theplantlist.org>. Four species of stranded walnuts have now been recorded from Irish maritime shores: Jamaican Walnut (*J. jamaicensis* C. DC.), Black Walnut (*J. nigra* L.), White Walnut (*J. cinerea* L.), and Persian Walnut (*J. regia*) (Quigley *et al.*, 2016, 2020; Quigley and Minchin, 2019; Quigley and McNamara, 2020; this paper). The Japanese Walnut (*J. ailantifolia* Carrière) and California Black Walnut (*J. californica* S.Watson) have also been recorded from the Dutch coast (Van der Ham *et al.*, 2013, 2014).

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PLATE 1. General views of Saint Maelruan's Persian Walnut Tree (*Juglans regia*) in the grounds of Saint Mary's Priory, Tallaght, Dublin, Ireland, 2 July 2019. Photographs © D. T. G. Quigley.

PLATE 2. General views of Saint Maelruan's Persian Walnut Tree (*Juglans regia*) in the grounds of Saint Mary's Priory, Tallaght, Dublin, Ireland, 2 July 2019. Photographs © D. T. G. Quigley.

PLATE 3. The fruit of Saint Maelruan's Persian Walnut Tree (*Juglans regia*) in the grounds of Saint Mary's Priory, Tallaght, Dublin, Ireland, 2 July 2019. Photographs © D. T. G. Quigley. Top: Walnut fruits. Bottom: Predated walnut fruits and nuts.

PLATE 4. Persian Walnut (*Juglans regia*). Left: Fanore Beach, Fanore Mor, County Clare, 13 September 2017. Right: Goilin, Carrowwntedaun, Lahinch, County Clare 9 March 2019. Photographs © Liam McNamara.

PLATE 5. Persian Walnuts (*Juglans regia*) from County Clare. Left: apical view. Middle: lateral view. Right: basal view. Photographs © Liam McNamara.

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ADDENDUM TO "A REVIEW OF THE IRISH JUMPING PLANT-LICE (HEMIPTERA: PSYLLOIDEA)"

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Abstract

New records of Irish Psylloidea are provided based on slide-mounted specimens in the collections of the Natural History Museum, London. Both *Cacopsylla* (*Hepatopsylla*) *brunneipennis* (Edwards, 1896) and *C.* (*Thamnopsylla*) *rhamnicola* (Scott, 1876) were recorded without details in the review of the Irish fauna by O'Connor and Malumphy (2011). The London material has provided records for these two species. In addition, new data are provided for another 14 species. Altogether, a total of 18 new county records are listed. The possibility is also discussed that *Cacopsylla* (*Thamnopsylla*) *alaterni* may have been collected by A. H. Haliday in the west of Ireland.

Key words: Psylloidea, Hemiptera, Ireland, checklist, new county records, jumping plant-lice, *Cacopsylla alaterni*, *Cacopsylla brunneipennis*, *Cacopsylla rhamnicola*.

Introduction

O'Connor and Malumphy (2011) reviewed the Irish psyllid (Hemiptera) fauna. A checklist was provided of the 50 known species along with new distributional data. However, it was only possible to report both *Cacopsylla brunneipennis* (Edwards, 1896) and *C. rhamnicola* (Scott, 1876) from Ireland without any other details. Their occurrence was mentioned in Hodkinson and White (1979) but no records were cited. Since the publication of the review, little research has been carried out on the group on the island. However, O'Connor (2012) did report the first Irish male of *Craspedolepta nebulosa* (Zetterstedt, 1828), a species previously only known from nymphs. As there have been some nomenclatural changes since O'Connor and Malumphy (*op. cit.*), a revised checklist is given (Appendix 1).

While preparing the information contained in O'Connor and Malumphy (*op. cit.*) for inclusion in a psyllid dataset for the National Biodiversity Data Centre, JPOC came across photographs of Irish specimens mounted on slides and housed in the Natural History Museum, London, through the Global Biodiversity Information Facility (GBIF) <https://www.gbif.org>.

Photographs of the slides had been made available by The Trustees of the Natural History Museum, London through the dataset Natural History Museum (London) Collection Specimens < Natural History Museum (2020). Natural History Museum (London) Collection Specimens. Occurrence dataset https://doi.org/10.5519/0002965>.

This material provided new data for 16 of the known Irish species including 18 new county records. Most important, records were found for *Cacopsylla brunneipennis* and *C. rhamnicola*. The vast majority of specimens were identified by David Hollis of the Natural History Museum, London. Many were also collected by him during a visit to Ireland in 1976.

The possibility is also discussed that *Cacopsylla* (*Thamnopsylla*) *alaterni* may have been collected by A. H. Haliday in the west of Ireland.

The records

***Aphalara exilis* (Weber and Mohr, 1804) (Fig. 1)**

KERRY: Dereenacullig near the Horses Glen (W0081), 1♂2♀♀ 5 August 1976, *Calluna/Ulex* stand, collected and determined D. Hollis.

WEXFORD: Saltee Island Great (X9596), 1♂ 2 June 1976, swept, collected M. C. D. Speight, determined D. Hollis.

This is the first record of *Aphalara exilis* from an Irish offshore island.

***Cacopsylla* (*Cacopsylla*) *mali* (Schmidberger, 1836)**

DUBLIN: Dundrum (O1628), 3♀♀ 11 August 1976, collected and determined D. Hollis.

KERRY: Tomies Wood (V9088), 1♂3♀♀ 6 August 1976, *Malus sylvestris*, collected and determined D. Hollis.

During the last 100 years, there has only been one other Irish record of *Cacopsylla mali* when it was found in Trinity College, Dublin, in 2011. All the other records are older.

***Cacopsylla* (*Cacopsylla*) *peregrina* (Foerster, 1848) New to County Cork**

CORK: near Carran (V9957), 1♂ 3 August 1976, *Quercus*, collected and determined D. Hollis.

DUBLIN: Dundrum (O1628), 1♂ 11 August 1976, collected and determined D. Hollis.

***Cacopsylla* (*Cacopsylla*) *sorbi* (Linnaeus, 1767) New to County Cork**

CORK: Rossnagrena (V8859), 3♂♂3♀♀ 4 August 1976, *Sorbus aucuparia*, collected and determined D. Hollis.

***Cacopsylla* (*Hepatopsylla*) *ambigua* (Foerster, 1848) New to County Cork**

CORK: Rossnagrena (V8859), 1♀ 4 August 1976, *Salix*, collected and determined D. Hollis.

KERRY: Muckross Wood (V9686), 3♂♂2♀♀ 7 August 1976, collected and determined D. Hollis.

***Cacopsylla* (*Hepatopsylla*) *brunneipennis* (Edwards, 1896) New to Counties Kerry and Wicklow (Fig. 2, Plates 1-2)**

KERRY: Lough Guitane (W0385), 1♀ 7 August 1976, *Betula*, collected and determined D. Hollis; Tomies Wood (V9088), ♂3♀♀ 6 August 1976, *Picea*, collected and determined D. Hollis.

WICKLOW: Knocksink Wood (O2117), 3♀♀ 12 August 1976, *Salix*, collected and determined D. Hollis.

This species was only recorded from "Ireland" by O'Connor and Malumphy (2011). *Cacopsylla brunneipennis* is a complex species with two colour morphs - the forms *typica* (brown wings) and *klapaleki* (clear wings)

***Cacopsylla* (*Hepatopsylla*) *pulchra* (Zetterstedt, 1840) New to County Kerry**

KERRY: Tomies Wood (V9088), 1♂2♀♀ 6 August 1976, *Salix*, collected and determined D. Hollis.

***Cacopsylla* (*Hepatopsylla*) *saliceti* (Foerster, 1848) New to County Cork**

CORK: near Carran (V9957), 5♂♂1♀ 3 August 1976, *Crataegus* and *Salix*, collected and determined D. Hollis; Rossnagrena (V8859), 1♂1♀ 4 August 1976, *Salix*, collected and determined D. Hollis.

WEXFORD: The Raven (T1124), 3♂♂1♀ 25 May 1975, collected M. C. D. Speight, determined D. Hollis.

***Cacopsylla* (*Thamnopsylla*) *alaterni* (Foerster, 1848)**

Cacopsylla alaterni was described as *Psylla alaterni* by Foerster (1848) based on *inter alia* two ♂♂ sent by A. H. Haliday under the manuscript name *alaterni*. Walker (1852) also mentioned Haliday material. O'Connor and Malumphy (2011) considered that this record required confirmation. The host plant is *Rhamnus alaternus* popularly known as Mediterranean or Italian buckthorn and as the name implies, it is a native of the Mediterranean region. Although it has been cultivated in British gardens since 1629, there appears to be only one subsequent record of *Cacopsylla alaterni* from *R. alaternus* in the British Isles. It is known that Haliday spent most of the years 1841-1848 in Italy (Nash and O'Connor, 2011) and there was a possibility that he had sent Italian specimens to Foerster from Ireland. However, prior to 1836, Haliday spent time collecting insects in Galway in the west of Ireland and provided parasitic wasps from there to Francis Walker (O'Connor *et al.*, 2004). As *R. alaternus* has become naturalised in an area near Lough Corrib not far from Galway City (grid reference M2-4-) (Anon, 2020), it is now possible that Haliday collected the psyllids in the garden of a demense or estate in that locality.

***Cacopsylla* (*Thamnopsylla*) *crataegi* (Schrank, 1801) New to County Cork (Fig. 3)**

CORK: near Carran (V9957), 3♂♂5♀♀ 3 August 1976, *Quercus*, collected and determined D. Hollis.

Cacopsylla crataegi was previously only known in Ireland from a male taken at Lough Bunny, County Clare (O'Connor and Malumphy, 2011).

***Cacopsylla* (*Thamnopsylla*) *melanoneura* (Foerster, 1848) New to Counties Cork and Kerry**

CORK: near Carran (V9957), 2♂♂1♀ 3 August 1976, *Quercus*, collected and determined D. Hollis.

KERRY: Lough Guitane (W0385), 1♀ 7 August 1976, *Betula*, collected and determined D. Hollis.

***Cacopsylla* (*Thamnopsylla*) *rhamnicola* (Scott, 1876) New to County Clare (Fig. 4)**

CLARE: Dromore Forest (R3585), 5♂♂4♀♀ 5 August 1976, *Euonymus* and *Rhamnus cathartica*, collected and determined D. Hollis.

This species was only recorded from "Ireland" by O'Connor and Malumphy (2011).

***Chamaepsylla hartigii* (Flor, 1861)**

KERRY: Lough Guitane (W0385), 3♀♀ 7 August 1976, *Betula*, collected and determined D. Hollis.

***Strophingia ericae* (Curtis, 1835) New to County Cork**

CORK: Glengariff Wood (V9156), 6♂♂3♀♀ 3-4 August 1976, *Calluna vulgaris*, collected and determined D. Hollis.

***Psyllopsis fraxinicola* (Foerster, 1848) New to Country Antrim**

ANTRIM: Portmore Harbour (C4258), ♂♀, August 1903 collected J. N. Halbert, determined J. P. O'Connor.

The locality for the above record is given as Portmore, County Donegal, in O'Connor and Malumphy (2011) as only "Portmore" was given on the label. However from Halbert (1935), it is evident that "Portmore" refers to Portmore Lough in County Antrim.

***Bactericera crithmi* (Low, 1877) New to County Cork**

CORK: Seal Harbour (V9052), 2♂♂ 10 July 1952, samphire, collected C. A. Prevost, determined I. D. Hodkinson.

***Trioza remota* Foerster, 1848 New to Counties Cork and Galway**

CORK: Glengarriff Forest (V9157), 1♀ 18 April 1975, swept in *Quercus* woodland, collected M. C. D. Speight, determined D. Hollis.

DUBLIN: Dundrum (O1627), 2♀♀ 23 April 1976, swept in garden, collected M. C. D. Speight, determined D. Hollis.

GALWAY: Derryclare Nature Reserve (L8349), 1♀ 12 March 1975, from *Taxus*, deciduous wood, collected M. C. D. Speight, determined D. Hollis.

***Trioza urticae* (Linnaeus, 1758) New to Counties Clare and Gaway**

CLARE: Lough Inchiquin (R2690), 6 adults 8 August 1976, *Urtica dioica*, collected and determined D. Hollis.

CORK: near Carran (V9957), 12 adults 3 August 1976, *U. dioica*, collected and determined D. Hollis.

GALWAY: Garryland Wood (M4206), 5 adults 10 August 1976, *U. dioica*, collected and determined D. Hollis.

KERRY: Lough Guitane (W0385), 11 adults 5 August 1976, *U. dioica*, collected and determined D. Hollis; Muckross Wood (V9686), 10 adults 7 August 1976, *U. dioica*, collected and determined D. Hollis; Tomies Wood (V8088), 11 adults 6 August 1976, *U. dioica*, collected and determined D. Hollis.

WEXFORD: Rosslare Strand (T0916), 2 adults 13 August 1976, *U. dioica*, collected and determined D. Hollis.

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The authors are indebted to the Global Biodiversity Information Facility and The Trustees of the Natural History Museum, London for making available the photographs of the slides. We also wish to thank David Hollis for his identifications and collection of specimens. The photographs were kindly provided by Joe Botting. The Irish distribution maps were prepared using DMAP and we are indebted to Dr Alan Morton for supplying the relevant programme.

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APPENDIX 1. A revised checklist of the Irish Psylloidea.

PSYLLOIDEA

APHALARIDAE LÖW, 1879

1. *Aphalara exilis* (Weber & Mohr, 1804)
2. *Aphalara polygoni* Foerster, 1848
   Synonym: *Aphalara poligoni* (Shinji, 1938)
3. *Aphalara ulicis* Foerster, 1848
4. *Craspedolepta flavipennis* (Foerster, 1848)
5. *Craspedolepta nebulosa* (Zetterstedt, 1828)
6. *Craspedolepta nervosa* (Foerster, 1848)
   Synonym: *Aphalara nervosa* Foerster, 1848
7. *Craspedolepta sonchi* (Foerster, 1848)
   Synonym: *Aphalaria picta* Zetterstedt, 1828
8. *Ctenarytaina eucalypti* (Maskell, 1890)
9. *Ctenarytaina peregrina* Hodkinson, 2007
10. *Ctenarytaina spatulata* Taylor, 1997
11. *Neocraspedolepta subpunctata* (Foerster, 1848)
    Synonym: *Craspedolepta subpunctata* (Foerster, 1848)

LIVIIDAE LÖW, 1879

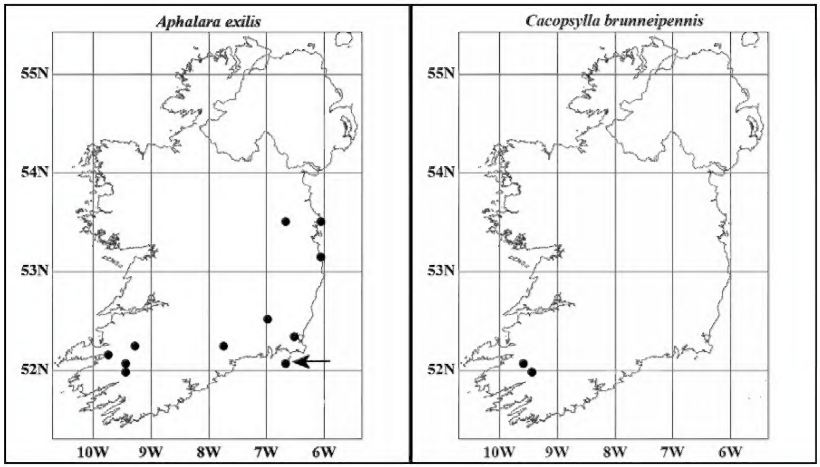
12. *Livia junci* (Schrank, 1789)
    Synonym: *Livia juncorum* (Latreille, 1798)
13. *Livilla ulicis* Curtis, 1836
14. *Psyllopsis discrepans* (Flor, 1861)
15. *Psyllopsis distinguenda* Edwards, 1913
16. *Psyllopsis fraxini* (Linnaeus, 1758)
17. *Psyllopsis fraxinicola* (Foerster, 1848)
18. *Strophingia ericae* (Curtis, 1835)

PSYLLIDAE LATREILLE, 1807

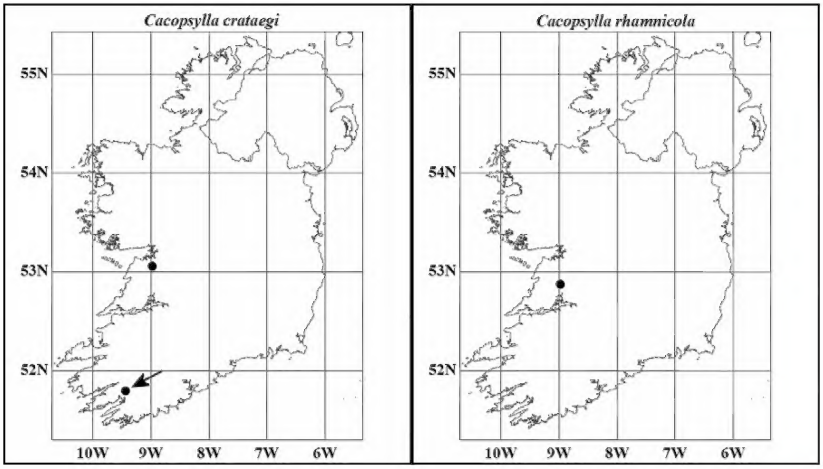
19. *Arytaina genistae* (Latreille, 1804)
    Synonym: *Arytaena genistae* Latreille, 1804
20. *Arytainilla spartiophila* (Foerster, 1848)
    Synonym: *Psylla spartii* Guérin-Méneville, 1843
21. *Baeopelma foersteri* (Flor, 1861)
22. *Cacopsylla* (*Cacopsylla*) *mali* (Schmidberger, 1836)
    Synonym: *Psylla aeruginosa* Foerster, 1848
    Synonym: *Psylla occulta* Foerster, 1848
23. *Cacopsylla* (*Cacopsylla*) *peregrina* (Foerster, 1848)
24. *Cacopsylla* (*Cacopsylla*) *sorbi* (Linnaeus, 1767)
25. *Cacopsylla* (*Hepatopsylla*) *ambigua* (Foerster, 1848)
26. *Cacopsylla* (*Hepatopsylla*) *brunneipennis* (Edwards, 1896)
27. *Cacopsylla* (*Hepatopsylla*) *hippophaes* (Foerster, 1848)
28. *Cacopsylla* (*Hepatopsylla*) *pulchra* (Zetterstedt, 1840)
29. *Cacopsylla* (*Hepatopsylla*) *pyri* (Linnaeus, 1758)
30. *Cacopsylla* (*Hepatopsylla*) *pyricola* (Foerster, 1848)
    Synonym: *Psylla apiophila* Foerster, 1848
31. *Cacopsylla* (*Hepatopsylla*) *saliceti* (Foerster, 1848)
    Synonym: *Psylla salicicola* Foerster, 1848 partim
32. *Cacopsylla* (*Thamnopsylla*) *alaterni* (Foerster, 1848)
33. *Cacopsylla* (*Thamnopsylla*) *crataegi* (Schrank, 1801)
    Synonym: *Psylla costatopunctata* Foerster, 1848
34. *Cacopsylla* (*Thamnopsylla*) *melanoneura* (Foerster, 1848)
    Synonym: *Psylla costalis* Flor (partim)
35. *Cacopsylla* (*Thamnopsylla*) *pruni* (Scopoli, 1763)
    Synonym: *Psylla fumipennis* Foerster, 1848
36. *Cacopsylla* (*Thamnopsylla*) *rhamnicola* (Scott, 1876)
37. *Chamaepsylla hartigii* (Flor, 1861)
38. *Psylla* (*Asphagidella*) *buxi* (Linnaeus, 1758)
39. *Psylla* (*Psylla*) *alni* (Linnaeus, 1758)
    Synonym: *Psylla fuscinervis* Foerster, 1848
    Synonym: *Psylla heydeni* Foerster, 1848
40. *Psylla* (*Psylla*) *betulae* (Linnaeus, 1758)
41. *Spanioneura fonscolombii* Foerster, 1848

TRIOZIDAE LÖW, 1879

42. *Bactericera albiventris* (Foerster, 1848)
43. *Bactericera crithmi* (Löw, 1877)
44. *Bactericera curvatinervis* (Foerster, 1848)
45. *Lauritrioza alacris* (Flor, 1861)
    Synonym: *Trioza alacris* Flor, 1861
46. *Powellia vitreoradiata* Maskell, 1879
    Synonym: *Trioza vitreoradiata* (Maskell, 1879)
47. *Trioza galii* Foerster, 1848
    Synonym: *Trioza velutina* Foerster, 1848
48. *Trioza munda* Foerster, 1848
49. *Trioza remota* Foerster, 1848
50. *Trioza urticae* (Linnaeus, 1758)



FIGURES 1-2. The known Irish distributions of *Aphalara exilis* (Weber & Mohr, 1804) and *Cacopsylla brunneipennis* (Edwards, 1896). The island record of *A. exilis* is indicated by an arrow.



FIGURES 3-4. The known Irish distributions of *Cacopsylla crataegi* (Schrank, 1801) and *C. rhamnicola* (Scott, 1876). The new record of *C. crataegi* is indicated by an arrow.

PLATE 1. Adult female, form *typica* of *Cacopsylla brunneipennis*. Huddersfield, England (February 2008). Photograph © Joe Botting.

PLATE 2. Adult male, form *klapaleki* of *Cacopsylla brunneipennis*. Huddersfield, England (February 2008). Photograph © Joe Botting.

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ADDITIONAL RECORDS OF CHIRONOMIDAE (INSECTA: DIPTERA) IN IRELAND WITH NEW RECORDS FROM COUNTIES LONGFORD, MAYO AND MEATH

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Abstract

Examination of recently collected adult male and pupal exuviae, as well as specimens collected in previous years, gave additional records for 32 species of Chironomidae (Diptera, Insecta) from Counties Donegal, Dublin, Longford, Mayo and Meath in HAs (Hydrometric Areas) 8, 9, 26, 32, 37 and 38. Three species are first records for County Longford - *Chironomus* (*Chironomus*) *piger* Strenzke, 1956, *Chironomus* (*C.*) *plumosus* (Linnaeus, 1758) and *Microtendipes pedellus* (De Geer, 1776). One species, *Tanytarsus sylvaticus* (van der Wulp, 1859) is new for County Mayo and HA32 while *Apsectrotanypus trifascipennis* (Zetterstedt, 1838) is documented for the first time in County Meath and HA8. Two species, *Limnophyes gurgicola* (Edwards, 1929) and *Dicrotendipes notatus* (Meigen, 1818) are new records for HA8 and *Smittia contingens* (Walker, 1856) is confirmed in HA8.

Key words: Chironomidae, Diptera, records, County, Hydrometric Area, distribution, Ireland.

Introduction

A comprehensive review of the distribution of Irish Chironomidae was given by Murray *et al.* (2018) based on known records up to December 2017. Since then, additional records were documented by Murray (2018, 2019a, 2019b), Murray and Langton (2018) and Murray and O'Connor (2018). It is the author's strategy to add to information on the occurrence and distribution of Chironomidae in Ireland on an ongoing basis, through collection of new material and by review of previously collected preserved bulk samples or slide mounted specimens.

Collections of Chironomidae in 2020 commenced in January and February around the author's home at Meadesbrook, near Ashbourne, County Meath and it was intended to continue collection there and at other locations in the country during the following months. An opportunity arose at the beginning of March to collect from an artificial lake at the Centre Parc resort, near Ballymahon, County Longford. However, because of the onset of the Covid-19 pandemic in Ireland in mid-March, and the consequent "lockdown" with enforced restriction on travel, other planned collection trips in 2020 were unavoidably cancelled. Nevertheless,

collections of Chironomidae continued around Meadesbrook and a review of specimens in existing collections was undertaken. This paper reports on the outcome of these efforts up to September 2020 and gives new distribution data, mostly based on pupal exuviae, from Counties Longford and Meath as well as from collections in earlier years in Counties Donegal and Mayo. One record from 1946 is given for County Dublin based on examination of a previously undetermined slide preparation by Carmel F. Humphries. The records detailed here add to knowledge of chironomid species distribution in those counties and in Hydrometric Areas 8, 9, 26, 32, 37 and 38.

Abbreviations used

EPA - Environmental Protection Agency; HA(s) - Hydrometric Area(s); leg. - collected by; Pe - pupal exuviae; ♂ - adult male imago.

Methods

Adult male chironomids were collected by aerial sweep netting. Pupal exuviae were collected by drift net in the stream examined or by skimming surface waters with a fine mesh net in lake littoral regions, water troughs and rainwater tanks. Adult males were identified from Langton and Pinder (2007) with further reference to Reiss and Fittkau (1971) for species of *Tanytarsus.* Pupal exuviae were slide mounted as temporary mounts in glycerine or as permanent mounts in Euparol and identified from Langton and Visser (2003). Records are given by County and Hydrometric Area (see <www.epa.ie> for details of HAs in Ireland) from seven sites - two in County Donegal (HAs 37 and 38), one each in Counties Dublin (HA9), Longford (HA26) and Mayo (HA32) and two adjacent sites in County Meath (HA8). Locality details of sampling sites, with six-figure Irish Grid Reference numbers are detailed below. Information on life cycle stages (♂ or Pe) obtained and date(s) of collection are given with each species record(s). Records are based on personal collections by the author unless otherwise stated.

Sampling sites

The locations in Counties and Hydrometric Areas from which records are reported are as follows:

DONEGAL: HA37 - Lough Eske, Blue Stack Mountains (G973844): HA38 - Lough Nageeragh, Dungloe (B761100).

DUBLIN: HA9 - Bohernabreena Reservoir, aquaduct (O101208).

LONGFORD: HA26 - Ballymahon artificial lake at Center Parc Resort (N196564).

MAYO: HA 32 - Westport Woods Hotel Grounds, Westport (L985843).

MEATH: HA8 - Meadesbrook, Kilmoon, Ashbourne. Records are reported from two sites: Meadesbrook-1 garden/yard (O040594), adults and pupal exuviae from a variety of rainwater filled containers including water barrels, tanks, pots, bird bath etc. (Plate 1); Meadesbrook-2 stream and surrounds (O038594), aerial sweep net and drift net collections. This is a shallow, low gradient, shaded rural stream, approximately 1.5m wide and 10-30cm deep (Plate 2).

Results

Distribution data is provided for 32 species, four in the Subfamily Tanypodinae, one in the Subfamily Diamesinae, fifteen in the Subfamily Orthocladiinae and twelve in the Subfamily Chironominae (Chironomini, 6; Tanytarsini, 6). The majority of records are from County Meath (HA8) in the vicinity of the author's home at Meadesbrook.

Subfamily TANYPODINAE

[References to previous records of Tanypodinae are from Murray *et al.* (2013) unless stated otherwise]

***Apsectrotanypus trifascipennis* (Zetterstedt, 1838) New to County Meath and HA8**

MEATH: HA8 - Meadesbrook-2, Pe, 5 May 2020.

There are 31 records of this species at 26 locations in Ireland from ponds, slow-flowing streams and lake littoral regions (Murray and O'Connor, 2018; Murray *et al*., 2018). This is the first record of *Apsectrotanypus trifascipennis* from County Meath and HA8.

The majority of records (16) in Ireland are in the River Shannon catchment in HAs 25 and 26. The species was first collected in Ireland in 1981 in HA9 from a pond on the campus of University College Dublin (Murray and Ashe, 1983).

***Conchapelopia melanops* (Meigen, 1818)**

MEATH: HA8 - Meadesbrook-2, Pe, 5 May 2020.

Conchapelopia melanops is widely distributed in Ireland with records from 100 locations (Murray, 2019 b; Murray *et al*., 2018). The emergence period of *C. melanops* in Ireland extends from the month of April to the beginning of October and the majority of records have been during the months of July and August. There are four previous records of the species from the present site at Meadesbrook, the first of which was on 31 May 1974 and the most recent in September 2006.

***Macropelopia nebulosa* (Meigen, 1804)**

MEATH: HA8 - Meadesbrook-2, Pe, 5 May 2020.

This is a common species in Ireland with records from 150 locations throughout the country (Murray, 2019b; Murray *et al*., 2018). There are three previous records at this site at Meadesbrook where it was first collected in April 1995 and most recently in May 2006.

***Zavrelimyia* (*Zavrelimyia*) *nubila* (Meigen, 1830)**

MEATH: HA8 - Meadesbrook-1, Pe, 29 March, 8 May and 8 September 2020.

This species is only known in Ireland from three locations, two in County Meath (including the present location) and one in County Wicklow. The first Irish record was from collection of an adult male at Meadesbrook in July 1968 (Murray, 1972) and it has subsequently been recorded at this location on a further eight occasions between 1997 and 2019. Pupal exuviae from a second location in County Meath, at Ardsallagh, Navan in the adjacent HA7, were collected in 1986 and 2000 from an animal drinking trough. The third location for this species was recently documented from County Wicklow in collections made in 1984 (Duigan, 1989) from a pond at Powerscourt Demense (Murray, 2018).

According to Cranston and Epler (2013), larvae of the majority of *Zavrelimyia* species inhabit sandy detritus-rich sediments in springs and in slow-flowing streams close to springs. However Fittkau (1962) considered larvae of *Z. nubila* as a characteristic species of small woodland pools and garden ponds (sometimes ephemeral) while Langton and Visser (2003) remarked on their occurrence also in lake littoral zones as well as in stagnant waters. More recently *Z. nubila* has been documented from man-made municipal ponds and fountains in Sweden by Hamerlik and Buková (2015) and in Slovakia by Oboña *et al.* (2017).

Subfamily DIAMESINAE

***Diamesa* (*Diamesa*) *insignipes* Kieffer, 1908**

DUBLIN: HA9 - Aquaduct at Bohernabreena Reservoir, Pe, 26 November 1946, leg. C. F. Humphries.

This record is based on a recently discovered unidentified slide preparation labelled "*Diamesa* indet." in the collections of C. F. Humphries. This record from 1946 is the earliest evidence of occurrence of the species in Ireland. There are fourteen other records in Ireland (Murray *et al.*, 2018) of which three are in the River Dodder catchment in HA9, two from 1968 (Murray, 1972) and one from 1974 (Dowling and Murray, 1981).

Subfamily ORTHOCLADIINAE

[Unless stated otherwise references to previous records of Orthocladiinae in Ireland are from Murray *et al.* (2014)]

***Acricotopus lucens* (Zetterstedt, 1850)**

MEATH: HA8 - Meadesbrook-1, ♂, Pe, 8 May 2020.

Larvae of *Acricotopus lucens* are typically found in standing waters and littoral regions of lakes, ponds and pools and occasionally in slow-flowing small streams (Andersen *et al.*, 2013).

The species is already known from the stream (Meadesbrook-2), approximately 200m distant from the rainwater barrel in the yard where pupal exuviae and adult males were collected.

***Brillia bifida* (Kieffer, 1909)**

MEATH: HA8 - Meadesbrook-1, ♂, 18 November 2019 and 1 January 2020.

There are now 14 records of *Brillia bifida* at this location at which it was first recorded in July 1967 (Murray, 1972). The species has a widespread distribution in Ireland and is known from 136 locations.

***Brillia longifurca* Kieffer, 1921**

MEATH: HA8 - Meadesbrook-2, ♂ and Pe, 4 May 2020.

This species has been previously documented in November 2012. There are fewer records of *Brillia longifurca* than *B. bifida* in Ireland and it is currently known from 69 locations, one more than cited by Murray *et al.* (2018) since it was collected from the River Glyde, County Louth, in September 2018 (Murray, 2019b).

***Eukiefferiella claripennis* (Lundbeck, 1898)**

MEATH: HA8 - Meadesbrook-2, Pe, 2 February and 4 May 2020.

Eukiefferiella claripennis has a widespread distribution in rivers and streams in Ireland with records from almost 150 locations throughout the country. It is a multi-voltine species with records in Ireland spanning the months from January to December. There are four previous records from the stream at Meadesbrook where it was first recorded in April 1982.

***Limnophyes gurgicola* (Edwards, 1929) New to HA8**

MEATH: HA8 - Meadesbrook-1, ♂ and Pe, 14 April 2020.

While this is the first record of *Limnophyes gurgicola* from HA8, there is one previous record of the species in County Meath in HA7 from a bog pool at Girley Bog, Fordestown (Murray, 2016; Murray *et al.*, 2018).

***Metriocnemus* (*Inermipupa*) *carmencitabertarum* Langton & Cobo, 1997**

MEATH: HA8 - Meadesbrook-1, ♂ and Pe, 29 March, 6 and 8 September 2020.

This species was described by Langton and Cobo (1997) based on adult males and female specimens reared from larvae collected from rain-filled pools, with a substratum of moss debris, in granitic depressions in north-western Spain. Since then the species has been reported from an array of anthropogenic habitats, including rainwater-filled troughs, buckets, tanks, bird-baths etc. It was first recorded from Ireland in County Meath in HA7 in 2012 (Murray, 2012a) and is now documented at 13 locations in the country. It is well established in a variety of outdoor rainwater filled containers around the author's garden/yard (Plate 1) where it was first recorded on 28 June 2012 (Murray, 2013). It is noteworthy that the record on 8 September 2020 is from mature 4th instar larvae and pharate pupae retrieved from accumulated wet organic debris that had been causing a blockage in the gutter of the house roof (approximately 8m above ground

level). It appears to be a multi-voltine species in Ireland with 4 to 5 generations annually between the months of March and December.

***Metriocnemus* (*Metriocnemus*) *eurynotus* (Holmgren, 1883)**

MEATH: HA8 - Meadesbrook-1, ♂ and Pe, 14 April 2020.

There are two previous records of this semi-terrestrial species at Meadesbrook, in September 1979 and October 2009. It is also known in HA7 in County Meath from collections in March and April 1968 and in March 1995.

***Parakiefferiella fennica* Tuiskunnen, 1986**

DONEGAL: HA37 - Lough Eske, Blue Stack Mountains, Pe, 14 July 2009, leg. EPA.

This species is only known in Ireland from Lough Eske from pupal exuviae collected in April 2009 by field research officers of the EPA (Murray, 2012b; Murray *et al.*, 2018). This second record comes from recent re-examination of bulk samples from the month of July at the same location.

***Parametriocnemus stylatus* (Spärck, 1923)**

MEATH: HA8 - Meadesbrook-2, Pe, 21 April and 4 May 2020.

This species is known from 190 localities throughout Ireland. There are three earlier records from the present site, the first in November 2005.

***Psectrocladius* (*Allopsectrocladius*) *obvius* (Walker, 1856)**

LONGFORD: HA26 - Ballymahon, Center Parc, Pe, 7 March 2020.

This species is mostly found in standing waters in ponds, pools and in littoral regions of lakes. It is now known from 57 locations throughout the country. This is the second record of the species in HA26 and County Longford but there are other records in HA26, in County Roscommon and County Mayo.

***Psectrocladius* (*Psectrocladius*) *limbatellus* (Holmgren, 1869)**

MEATH: HA8 - Meadesbrook-1, ♂ and Pe, 29 March, 15 April and 2 September 2020.

There are five previous records of this species at this location between 1999 and 2018, four from collections in the month of April and one in July. It is a species with broad ecological requirements that has also been reported in association with *Zavrelimyia nubila* (see above) from urban fountains in Sweden (Hamerlik and Bukvová, 2015).

***Psectrocladius* (*Psectrocladius*) *sordidellus* (Zetterstedt, 1838)**

LONGFORD: HA26 - Ballymahon, Center Parc, Pe, 7 March 2020.

There are records of this species from 97 locations in Ireland. This is only the second record in County Longford although there are six previous records in HA26 (Murray, 2018; Murray and Ashe, 2017; Murray and O'Connor, 2018).

***Rheocricotopus* (*Rheocricotopus*) *fuscipes* (Kieffer, 1909)**

MEATH: HA8 - Meadesbrook-2, Pe, 2 February 2020.

This species is widespread in Ireland with records from 108 locations mostly in streams and rivers. There are four previous records of the species at this site, the first of which was on 31 May 1974.

***Smittia contingens* (Walker, 1856) Confirmed for HA8**

MEATH: HA8 - Meadesbrook-1, ♂ and Pe, 29 February 2016.

This species is previously on record from County Meath in the adjoining HA7 (Murray, 2016). In tabulation of records in the Hydrometric Areas of Ireland, Murray *et al.* (2018, p. 138) included *Smittia contingens* in HA8 based on this unpublished record at Meadesbrook. The details are given here to validate the record of the species in HA8.

***Tvetenia discoloripes* (Goetghebuer & Thienemann, 1936)**

MEATH: HA8 - Meadesbrook-2, Pe, 1 January, 2 February, 1 and 5 May 2020.

Tvetenia discoloripes is known from 65 locations throughout Ireland. It has been documented previously from this small stream at Meadesbrook on seven occasions since May 1974.

Subfamily CHIRONOMINAE

[Unless stated otherwise references to previous records of Chironominae in Ireland are from Murray *et al.* (2015)]

Tribe Chironomini

***Chironomus* (*Chironomus*) *luridus* Strenzke, 1959**

DUBLIN: HA9 - Castleknock, (O090370), rainwater filled plastic dustbin ♂ and Pe, 22 April 2020, leg. J. P. O'Connor. **MEATH: HA8 -** Meadesbrook-1, ♂ and Pe, 14 April and 8 September 2020.

This species has been previously recorded at both of the above locations, once at Castleknock and on ten previous occasions at Meadesbrook.

***Chironomus* (*C.*) *piger* Strenzke, 1956 New to County Longford**

LONGFORD: HA26 - Ballymahon, Center Parc, Pe, 7 March 2020.

There are comparatively few records in Ireland of *Chironomus* (*C.*) *piger* and this is the first record of the species in County Longford and a third record for HA26. Two records reported in HA26 from County Roscommon (Murray, 2018) were not available for inclusion in the review and checklist of Irish Chironomidae (Murray *et al.*, 2018), published in May 2018, that was based on distribution records up to December 2017. The species is now known from 30 locations, including this record at Ballymahon.

***Chironomus* (*C.*) *plumosus* (Linnaeus, 1758) New to County Longford**

LONGFORD: HA26 - Ballymahon, Center Parc, Pe, 7 March 2020.

This species is common in eutrophic waters and is known from 73 locations in Ireland. It has not been reported previously from County Longford although there are five records from HA26,

the most recent of which was reported in Murray and O'Connor (2018) from Lough Ree which is bordered by parts of County Roscommon (west shoreline) as well as Counties Longford and Westmeath (east shoreline).

***Dicrotendipes notatus* (Meigen, 1818) First record for HA8**

MEATH: HA8 - Meadesbrook-1, ♂, 1 May; ♂ and Pe, 6 May and 8 September 2020.

An adult male *Dicrotendipes notatus* was caught on the wing on 1st May. On further investigation of nearby water tanks exuviae and an emerging adult male were collected five days later. Sampling the same tank four months afterwards exuviae and a drowned adult male were also obtained. This species is already documented from 19 locations in Ireland (Murray *et al*., 2018). There are no previous records from HA8 but it is known in HA7 in County Meath from an animal drinking trough. The majority of Irish records are from lakes, ponds and slow-flowing rivers but there are several records from small artificial habitats, such as drinking troughs or rain-filled water tanks similar to the present record.

***Microtendipes chloris* (Meigen, 1818)**

MEATH: HA8 - Meadesbrook-1, Pe, 11 and 20 April 2020.

Microtendipes chloris was first recorded at this site in May 2006. The earliest record of the species in Ireland is from a pharate pupa collected in 1947 at Bohernabreena Reservoir, County Dublin (HA9) that was identified to genus level only as *Microtendipes* sp. by Fitzgerald (1947). A slide preparation of the pupa, discovered in the collections of C. F. Humphries, was identified to species level by the author and reported in Murray *et al*. (2015).

***Microtendipes pedellus* (De Geer, 1776) New to County Longford**

LONGFORD: HA 26 - Ballymahon, Center Parc, ♂ and Pe, 7 March 2020.

This is a widely distributed species in Ireland with six previous records in HA 26, one each in Counties Cavan, Leitrim and Westmeath and three in County Roscommon, (Murray, 2018; Murray and O'Connor, 2018). The collections from the lake at Center Parc provides the first record of *Microtendipes pedellus* in County Longford.

Tribe Tanytarsini

***Micropsectra notescens* (Walker, 1856)**

MEATH: HA8 - Meadesbrook-1, ♂ and Pe, 22 March and 8 May 2020.

Micropsectra notescens is documented from 47 locations in rivers, streams and ponds and Ireland. There are eight previous records at Meadesbrook, the first in March 1996. The earliest record from County Meath was in HA7 in May 1982.

***Micropsectra pallidula* (Meigen, 1830)**

MEATH: HA8 - Meadesbrook-2, Pe, 1 January, 2 February and 2 May 2020.

Micropsectra pallidula is widely distributed in Ireland with records from 116 locations throughout the country. There are six previous records at Meadesbrook, the first in July 1968 and the most recent, until now, in May 2019 (Murray, 2019a).

***Micropsectra rosiventris* (Kieffer, 1909)**

MEATH: HA8 - Meadesbrook-1, Pe, 10 October 2019 and 8 September 2020.

Micropsectra roseiventris is known from 51 locations in Ireland in ponds, bog pools, ditches, lake littoral regions and slow flowing rivers. There was one previous record at Meadesbrook, from November 2005.

***Tanytarsus gregarius* Kieffer, 1909**

DONEGAL: HA38 - Lough Nageeragh, Pe, 26 October 1985, leg. C. Duigan.

All existing records of this species in Ireland, as pupal exuviae or adult males, are from collections between the months of March and October. The species is already known from seven locations in HA38 in County Donegal from collections between July and the first week in September in the years between 1985 and 2002. The record from Lough Nageeragh during the last week of October in 1985, in recently examined formalin preserved bulk sample collections of Cladocera by Catherine Duigan (Duigan, 1989), is a new location for the species in Donegal and extends, by several weeks, the emergence period of the species in the county.

***Tanytarsus sylvaticus* (van der Wulp, 1859) New to County Mayo and HA32**

MAYO: HA32 - Westport Woods Hotel Grounds, ♂, 7 March 2018.

Tanytarsus sylvaticus is a seasonal univoltine species with maximum emergence in spring during the month of April (Reiss and Fittkau, 1971). The species is known at five locations in Ireland, from collections during the months of March and April only, in Counties Cavan, Derry (Londonderry), Kildare and Monaghan in HAs 3, 9, 26 and 36 (Murray *et al*., 2018). This record from March 2018, extends the known distribution of the species westwards in Ireland and is the first record of the species for HA 32 and County Mayo

***Tanytarsus usmaensis* Pagast, 1931**

MEATH: HA8 - Meadesbrook-2, Pe, 5 May 2020.

There are 30 records of *Tanytarsus usmaensis* in Ireland. The first record in County Meath was from the River Boyne in HA7 in August 1988. There is one previous record in HA8, at Knock Pond, near Balrothery, in the bordering County Dublin.

Summary

Distribution data are given for 32 species of Chironomidae. *Apsectrotanypus trifascipennis* is a new record for County Meath and HA8 and *Limnophyes gurgicola* and *Dicrotendipes notatus* are documented for the first time in HA8. Three species, *Chironomus* (*C.*) *piger*, *Chironomus* (*C.*) *plumosus* and *Microtendipes pedellus* are recorded as new for County Longford and

Tanytarsus sylvaticus is recorded for the first time in County Mayo and HA32 while distribution data is given for *Smittia contingens* to validate its record for HA8.

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PLATE 1. Meadesbrook, Ashbourne, County Meath. Some rainwater-filled containers providing habitats for Chironomidae. Top left: tank. Top right: bucket and *Metriocnemus* larvae. Bottom: bird bath and pan. Photographs © D. A. Murray.

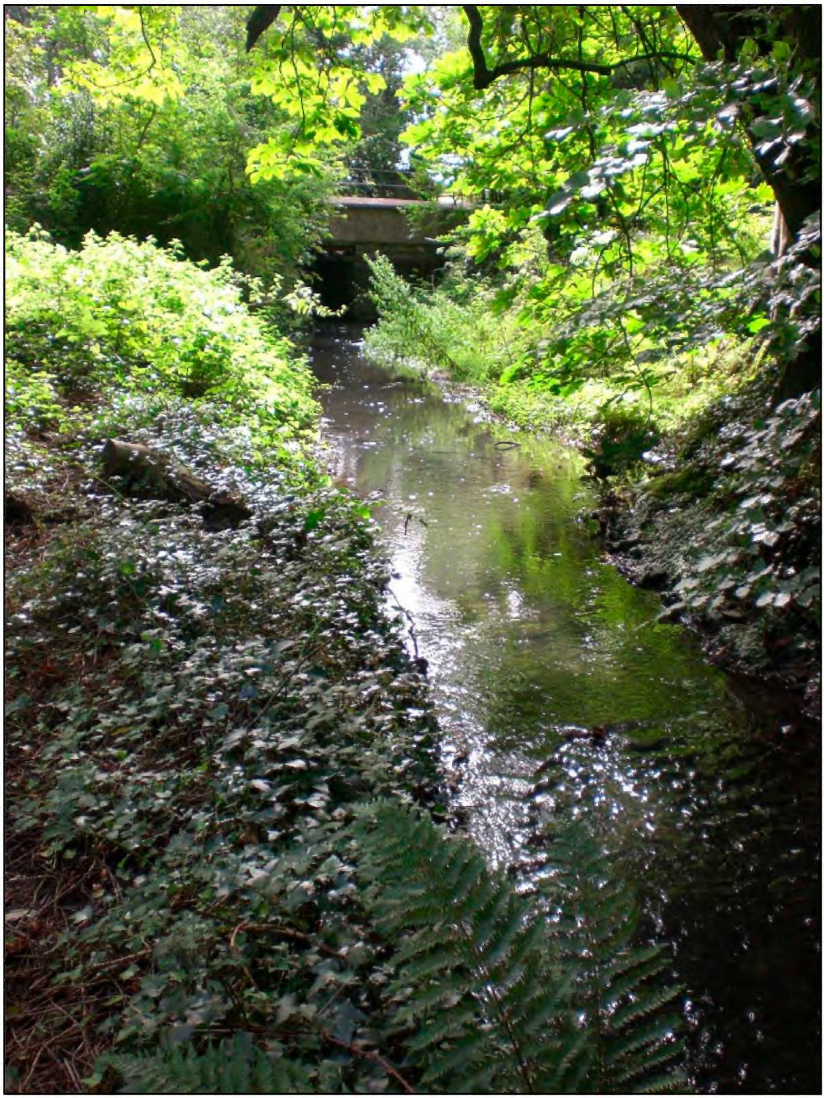

PLATE 2. Meadesbrook stream, Ashbourne, County Meath. Photograph © D. A. Murray.

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SOME FURTHER DISTRIBUTION RECORDS OF CADDISFLIES (TRICHOPTERA) FROM IRELAND

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Abstract

New distributional data for Irish caddisflies (Trichoptera) are provided along with some updated maps. New county records are noted.

Key words: Trichoptera, caddisflies, Ireland, new records, distribution.

Introduction

Recently, O'Connor (2020a) published *A National Grid Atlas of the Irish Caddisflies (Trichoptera)*. This online publication complements O'Connor (2015) *A catalogue and atlas of the caddisflies (Trichoptera) of Ireland*. It provides distribution maps for all the 156 Irish species along with a revised checklist and notes on habitats and flight periods. There is also a revised list of county records. The maps are based on 16,067 non-duplicate records contained in the catalogue and the subsequent Addenda (1-3). The maps do not include the distributional data in O'Connor and O'Connor (2020). Those data (Addendum 4) from O'Connor and O'Connor (2020) were subsequently uploaded by the National Biodiversity Data Centre to the dataset "Caddisflies (Trichoptera) of Ireland" on 10 July 2020 and are now available on updated distribution maps (O'Connor, 2020b).

Research on the distribution of the Irish caddisflies (Trichoptera) has continued since O'Connor and O'Connor (2020). Due to Covid 19 health regulations and poor weather, the author's field-work has been restricted. However, specimens and data were sent by various collectors around the island during the lockdown period and afterwards. These have resulted in a considerable body of new information which is presented here along with 2020 records collected by J. P. O'Connor and M. A. O'Connor. Some records which were in Addendum 1, but unpublished, are also listed for completeness. The remaining records will be included in Addendum 5 and sent to the National Biodiversity Data Centre in due course.

Unless otherwise stated, specimens were identified by the author. The specimens were determined using Edington and Hildrew (1995), Wallace, Wallace and Philipson (2003), Malicky (2004), Waringer and Graf (2011), Barnard and Ross (2012), Salokannel and Mattila

(2018) and Neu (2019). Voucher material of the rarer species has been retained in the O'Connor collection.

RHYACOPHILIDAE

***Rhyacophila dorsalis* (Curtis, 1834)**

DUBLIN: Castleknock (O0837), 1♀ 22 August 2020, on the outside window of a suburban house, J. P. O'Connor.

The adult probably originated in the nearby River Tolka.

LAOIS: stream near Vicarstown (N5803), 2♂♂2♀♀ 3 August 1986 , J. P. O'Connor.

WICKLOW: Ballydonnell Brook, Ballylow Bridge (O0612), 1♂ 28 April 2020, collected & determined H. Feeley.

***Rhyacophila munda* McLachlan, 1862**

WICKLOW: River Avonbeg near Greenan (T1487), 1♂ 23 April 2020, collected & determined H. Feeley.

Although *Rhyacophila munda* has been previously recorded from this square, the new capture is mentioned here due to its early emergence. The species normally flies from July to November. However Dick Harris collected an adult on the 12 May.

GLOSSOSOMATIDAE

***Agapetus fuscipes* Curtis, 1834**

GALWAY: Lough Kip River, Oguil, Moycullen (M2231), 5 larvae 21 May 2016, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

TIPPERARY: low stream in Flagh Bog (R9396), 1♂ 8 August 2016, collected & determined J. Brophy.

***Agapetus ochripes* Curtis, 1834**

MEATH: River Boyne, Trim (N8056), 1♂1♀ 29 July 2020 & 2♂♂4♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

***Glossosoma boltoni* Curtis, 1834**

GALWAY: Lissareaghaun Bog (M8519), 1♀ 3 June 2016, K. G. M. Bond.

KERRY: Lough Leane, Killarney (V9686), 1♀ 5 September 1972, J .P. O'Connor.

KILKENNY: River Nore, Inistioge (S6337) 1♀ 10 August 2017, light-trap, J. P. O'Connor & M. A. O'Connor.

WEXFORD: River Boro, Soldier's Hole (S9636), 11♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor. River Urrin, Enniscorthy (S9638), 1♂2♀♀ 6 August 2017, J. P. O'Connor & M. A. O'Connor.

WICKLOW: River Ow near Aughrim (T1179), 1♀ 23 April 2020, collected & determined H. Feeley.

HYDROPTILIDAE

***Agraylea multipunctata* Curtis, 1834 (Fig. 1)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 4♂♂ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

***Hydroptila cornuta* Mosley, 1922 New to County Meath (Fig. 2)**

CAVAN: Lough Ramor, Virginia (N6087), 1♀ 12 August 2020, Lakeside Manor (N6286), 1♂ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

This is the third locality for the species in County Cavan.

MEATH: River Boyne, Trim (N8056), 3♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

The latest Irish flight date was previously 3 September.

***Hydroptila forcipata* (Eaton, 1873) (Fig. 3)**

KERRY: River Flesk near Lough Guitane (W0185), 1♀ 10 October 1972, J. P. O'Connor.

MEATH: River Boyne, Trim (N8056), 4♂♂3♀♀ 29 July 2020, J. P. O'Connor & M. A. O'Connor.

WEXFORD: River Boro, Soldier's Hole (S9636), 2♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

***Hydroptila simulans* Mosely, 1920 (Fig. 4)**

MEATH: River Boyne, Trim (N8056), 3♂♂ 29 July 2020 & 1♂3♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

***Hydroptila sparsa* Mosely, 1920**

KILKENNY: River Nore, Inistioge (S6337), 1♂ 10 August 2017, light-trap, J. P. O'Connor & M. A. O'Connor.

MEATH: River Boyne, Trim (N8056), 3♂♂2♀♀ 29 July 2020 & 3♂♂4♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

WEXFORD: Oaklands Lake, New Ross (S7125), 1♀ 7-8 August 2017, the light-trap was also sited near a stream, J. P. O'Connor & M. A. O'Connor. River Boro, Soldier's Hole (S9636), 2♂♂3♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

***Ithytrichia lamellaris* Eaton, 1873**

MEATH: River Boyne, Trim (N8056), 8♂♂2♀♀ 29 July 2020 & 12♂♂8♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

***Orthotrichia costalis* (Curtis, 1834)**

WATERFORD: Belle Lake, pump house (S6605), 9♀♀ 8 June 2020, light-trap, A. Walshe.

Although *Orthotrichia costalis* has been previously taken on this lake, the new record is mentioned due to it being the earliest recorded Irish emergence.

***Oxyethira flavicornis* (Pictet, 1834) (Fig. 5)**

WICKLOW: King's River (O0401), 9♂♂ 20-21 September 1973, light-trap near numerous bog pools and river, J. P. O'Connor. Pollaphuca (Blessington) Reservoir, Boystown (N9808), 1♀ 6 August 2020, J. P. O'Connor & M. A. O'Connor.

***Tricholeiochiton fagesii* (Guinard, 1879) (Fig. 6)**

A male was raised from a pupa found on a charophyte sample retrieved from Lough Garr, County Westmeath (N3466). This is the second adult record of *Tricholeiochiton fagesii* in Ireland and the first male specimen (Brophy and O'Connor, 2020).

PHILOPOTAMIDAE

***Philopotamus montanus* (Donovan, 1813) (Fig. 7)**

Myles Nolan took two males of *Philopotamus montanus* in tree-trunk traps at Silver River, County Offaly (N2407) on 27 May-28 June 2019. The species was new to that county and is now known from 23 of the 32 counties (Nolan and O'Connor, in press).

KERRY: Cappagh River (flows into Lough Guitane) (W0382), 1♀ 31 October 2019, collected & determined M. Nolan.

***Wormaldia occipitalis* (Pictet, 1834)**

WEXFORD: Johnstown Castle, Garden Lake (T0116), 1♂ 15 August 2017, stream entering lake, J. P. O'Connor. Kilmokea Gardens (S6816), 4♂♂ 31 June 2011, pond/stream, J. P. O'Connor.

ECNOMIDAE

***Ecnomus tenellus* (Rambur, 1842)**

GALWAY: Lough Corrib, Hurney's Point (M2531), 10♂♂35♀♀ 30 July 2003, light-trap, K. G. M. Bond.

KERRY: Muckross Lake, Colleen Baun (Bawn) Rock (V9485), 2♂♂ 27-28 July 1973, light-trap, J. P. O'Connor.

POLYCENTROPODIDAE

***Cyrnus trimaculatus* (Curtis, 1834)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 1♂ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

CLARE: Lough Derg, Mount Shannon (R7186), 1♂ 26-27 August 2003, light-trap, K. G. M. Bond.

KERRY: Muckross Lake, Camillian Bay (V9486), 3♂♂ 20 June 1973, J. P. O'Connor.

***Holocentropus picicornis* (Stephens, 1836)**

GALWAY: Lough Corrib, Hurney's Point (M2531), 1♂1♀ 30 July 2003, light-trap, K. G. M. Bond.

***Neureclipsis bimaculata* (Linnaeus, 1758) (Fig. 8)**

OFFALY: River Shannon, Shannonbridge, Lanesborough (M9624), larvae August 2016, in benthic dredge, Aquatic Services Unit (2016).

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), adult 9 June 2019, S. Voss, identified from a photograph.

***Plectrocnemia conspersa* (Curtis, 1834)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1 larva 23 April 2020, in small stream, identified from a photograph, 1♂ 13 June 2020, on wooden garden fence & 1♂ 18 June 2020, on a shed-wall, S. Voss.

WICKLOW: Knocksink Woods (O2117), 1♀ 3-6 July 1995, Malaise Trap by flush in woodland, C. Ronayne.

***Plectrocnemia geniculata* McLachlan, 1871**

GALWAY: Lough Kip River, Oguil, Moycullen (M2231), 1 larva 21 May 2016, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

***Polycentropus flavomaculatus* (Pictet, 1834)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 17♂♂1♀ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

GALWAY: Lough Corrib, Cloonmore (M2241), 15♂♂ 21 June 2016, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

KILKENNY: River Nore, Inistioge (S6337), 1♂ 10 August 2017, light-trap, J. P. O'Connor & M. A. O'Connor.

LAOIS: stream near Vicarstown (N5803), 1♂ 3 August 1986, J. P. O'Connor.

TIPPERARY: River Suir, Carrick on Suir (S3921), 1♂ 17 August 2017, J. P. O'Connor & M. A. O'Connor. A slow stream in Flagh Bog (R9396), 1♂ 8 August 2016, collected & determined J. Brophy.

WATERFORD: Knockaderry Reservoir (S4906), 2♂♂ 13 August 2017, outflow, J P. O'Connor.

WEXFORD: River Boro, Soldier's Hole (S9636), 2♂♂3♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

***Polycentropus irroratus* (Curtis, 1835) (Fig. 9)**

MEATH: River Boyne, Ramparts, Navan (N8868), 1♂1♀ 22 July 2020, J. P. O'Connor & M. A. O'Connor.

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), adult 14 July 2019, S. Voss, identified from a photograph. A slow stream in Flagh Bog (R9396), 1♂ 8 August 2016, collected & determined J. Brophy.

PSYCHOMYIIDAE

***Lype phaeopa* (Stephens, 1836) New to County Tipperary (Fig. 10)**

MEATH: River Boyne, Ramparts, Navan (N8868), 2♂♂ 22 July 2020, J. P. O'Connor & M. A. O'Connor.

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1♀ 24 May 2020, on a shed-wall, S. Voss.

WEXFORD: River Boro, Soldier's Hole (S9636), 2♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

***Lype reducta* (Hagen, 1868) New to County Waterford (Fig. 11)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1♀ 16 August 2020, on a shed-wall, S. Voss.

WATERFORD: Belle Lake (S6605), 1♀ 8 June 2020, light-trap at the Pump House beside the lake, A. Walshe.

***Psychomyia pusilla* (Fabricius, 1781)**

KERRY: Muckross Lake, Colleen Baun (Bawn) Rock, Killarney (V9485), 1♀ 27-28 July 1973, light-trap, J. P. O'Connor.

TIPPERARY: Nenagh River, Millersbrook (R8780), 2♂♂2♀♀ 8 July 1976, collected & determined M. A. O'Connor. River Suir, Carrick on Suir (S3921), 11♂♂4♀♀ 17 August 2017, J. P. O'Connor & M. A. O'Connor.

***Tinodes waeneri* (Linnaeus, 1758)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 13♂♂9♀♀ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

DUBLIN: Castleknock (O0837), 1♀ 6 September 2016, on the outside of a lighted window of a suburban house, J. P. O'Connor. Leixlip Reservoir (O0035), 1♂ 3 October 2016, M. A. O'Connor.

ROSCOMMON: Lough Ree, The Warren (N0054), 1♂2♀♀ 3 September 2016, St John's Wood (N0056), 4♀♀ 4 September 2016. All collected & determined J. Brophy.

WATERFORD: Knockaderry Reservoir, outflow (S4906), 7♂♂5♀♀ 13 August 2017, J. P. O'Connor. Tramore (S5701), 1♂ 15 September 2016, 125w MV Robinson light-trap, T. Bryant.

WEXFORD: Johnstown Castle, Castle Lake (T0216), 5♂♂5♀♀ 12 August 2017, Garden Lake (T0116), 1♀ 15 August 2017, stream exiting lake, Lower Lake (T0216), 1♀ 15 August 2017, J. P. O'Connor.

Tinodes waeneri was recorded from the grounds of Johnstown Castle by King and Halbert (1910).

WICKLOW: Pollaphuca (Blessington) Reservoir, Blessington Bridge (N9914), 2♂♂ 6 August 2020, J. P. O'Connor & M. A. O'Connor.

HYDROPSYCHIDAE

***Cheumatopsyche lepida* (Pictet, 1834)**

KILDARE: River Liffey near Tankardsgarden (N8117), larvae 18 July 2019, collected & determined H. Feeley.

LAOIS: River Barrow near Trascan (N5812), larvae 4 June 2020, collected & determined H. Feeley.

***Hydropsyche instabilis* (Curtis, 1834)**

WEXFORD: Johnstown Castle, Garden Lake (T0116), 1♀ 15 August 2017, stream exiting lake, J. P. O'Connor.

***Hydropsyche pellucidula* (Curtis, 1834)**

WEXFORD: River Boro, Soldier's Hole (S9636), 1♂2♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

***Hydropsyche siltalai* Döhler, 1963**

CAVAN: Lough Sheelin, Chambers Bay (N4285), 1♀ 25 June 2020, 6 watt light-trap, C. McNaughton.

DUBLIN: River Liffey, Strawberry Beds (O0935), 1♂ 1 July 2016, swept on the river bank, J. P. O'Connor.

GALWAY: Lough Kip River, Oguil, Moycullen (M2231), 6 larvae 21 May 2016, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

LAOIS: stream near Vicarstown (N5803), 1♀ 3 August 1986 , J. P. O'Connor.

WEXFORD: River Boro, Soldier's Hole (S9636), 8♂♂32♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

PHRYGANEIDAE

***Agrypnia obsoleta* (Hagen, 1864) (Fig. 12)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), adult 15 July 2019, identified from a photograph, S. Voss.

***Agrypnia pagetana* Curtis, 1835**

CAVAN: Lough Sheelin, Mullaghboy (N4285), 1♀ 23 May 2017 & 3♂♂ 26-27 July 2017, light-trap at harbour, Chambers Bay (N4285) 1♂ 7 June 2020, 6 watt light-trap, all C. McNaughton.

***Phryganea bipunctata* Retzius, 1783**

CAVAN: Lough Sheelin, Chambers Bay (N4285), 1♂ 17 May 2020, 6 watt light-trap, Kilnahard shore (N4385), 1♂ 5 June 2020, in a boat, Mullaghboy (N4285), 1♂1♀ 21 May 2017, all C. McNaughton.

***Phryganea grandis* Linnaeus, 1758**

CAVAN: Lough Sheelin, Mullaghboy (N4285), 1♀ 26 July 2017, light-trap at the harbour, C. McNaughton.

***Trichostegia minor* (Curtis, 1834) (Fig. 13) (Fig. 13)**

Myles Nolan took a male of *Trichostegia minor* in a tree-trunk trap at Knockbarron Wood, Kinnity, County Offaly (N1706) on 6 May–5 July 2019. This was the third Irish record and the second adult one. The species was new to County Offaly (Nolan and O'Connor, in press).

GOERIDAE

***Goera pilosa* (Fabricius, 1775)**

CAVAN: Lough Sheelin, Mullaghboy (N4285), 1♂ 27 July 2017, light-trap at the harbour, C. McNaughton.

DUBLIN: River Liffey (O0935), 1♂ 1 July 2017, dead in a spider's web on a light fitting in the car park of the Angler's Rest, J. P. O'Connor.

***Silo nigricornis* (Pictet, 1834)**

GALWAY: Lough Kip River (M2231), 1 larva 21 May 2016, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

***Silo pallipes* (Fabricius, 1781)**

DUBLIN: Slade of Saggart (O0324), 1♂ 7 August 1981, swept along a small stream, J. P. O'Connor.

WATERFORD: Tramore (S5701), 1♂ 6 July 2017, 125w MV Robinson light-trap, T. Bryant.

LEPIDOSTOMATIDAE

***Lepidostoma hirtum* (Fabricius, 1775)**

MEATH: River Boyne, Trim (N8056), 1♂2♀♀ 29 July 2020 & 1♂5♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

WEXFORD: River Boro, Soldier's Hole (S9636), 49♀♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

LIMNEPHILIDAE

***Anabolia nervosa* (Curtis, 1834)**

WESTMEATH: Royal Canal, Kildallan Bridge (N3456), 1♀ 18 October 2016, collected & determined J. Brophy.

***Glyphotaelius pellucidus* (Retzius, 1783)**

CORK: Glinny, Riverstick (W6658), 2♀♀ 8-28 June 2005, Malaise Trap in alder *Alnus* woods with seasonal streams/ponds, M. C. D. Speight.

DUBLIN: University College Dublin, Belfield (O1830), larvae 16 January 2018, pond, collected & determined H. Feeley.

LAOIS: Abbeyleix Bog (S4383), 1♀ 14 July 2017, swept from an oak *Quercus* tree, J. P. O'Connor.

***Limnephilus affinis* Curtis, 1834**

GALWAY: Lough Corrib, Cloonmore (M2241), 1♂ 21 May 2016, 15w actinic light-trap, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

WATERFORD: Mount Congreve (S5310), 1♂ 11 August 2017, dead in a spider's web in an outhouse near a lake, J. P. O'Connor.

WEXFORD: Kilmokea Gardens (S6816), 1♀ 31 June 2011, pond/stream, J. P. O'Connor. Oaklands Lake, New Ross (S7125), 2♀♀ 17-18 August 2017, J. P. O'Connor & M. A. O'Connor.

WICKLOW: Pollaphuca (Blessington) Reservoir, Boystown (N9808), 1♂ 6 August 2020, J. P. O'Connor & M. A. O'Connor. The Murrough, Five Mile Point (O3102), 1♀ 14 September 2016, collected & determined J. Brophy.

***Limnephilus auricula* Curtis, 1834**

CAVAN: Lough Sheelin, Mullaghboy (N4385), 1♂1♀ 26 July 2017, light-trap in the woods beside the lake, C. McNaughton.

CORK: Fota Wildlife Park (W7871), 2♂♂ 13-19 April, 1♂ 4-10 May, 1♂ 18-24 May & 1♂ 1-7 June 2020, Rothamsted Insect Survey light-trap per A. Riley.

Two males were previously recorded from the Wildlife Park but with a grid reference of W7874 in O'Connor (2015).

GALWAY: Lough Corrib, Cloonmore (M2241), 2♂♂ 21 May 2016, 15w actinic light-trap, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

KERRY: Lough Leane, Golf Course shore (V9291), 1♀ 20 October 1994, J. P. O'Connor.

OFFALY: Alderborough, Geashill (N4421), 1♂ 17 September 2020, light-trap, B. Sullivan.

WATERFORD: Tramore (S5701), 1♂ 8 September 2016, 125w MV Robinson light-trap, T. Bryant.

WEXFORD: Carrigbyrne (S8224), 1♂ 13 July 1991, farmland, J. P. O'Connor.

***Limnephilus binotatus* Curtis, 1834 New to County Waterford (Fig. 14)**

WATERFORD: Belle Lake (S6605), 2♀♀ 8 June 2020, light-trap at the Pump House beside the lake, A. Walshe.

***Limnephilus centralis* Curtis, 1834**

CAVAN: Lough Sheelin (N4285), 1♂ 28 July 2017, light-trap in a field near the lake, C. McNaughton.

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), adult 30 July 2019, identified from a photograph, 1♂ 17 May 2020, on the wall of a shed & 1♀ 24 May 2020, on the wall of a house, S. Voss.

WICKLOW: Tinode near Manor Kilbride (O0119), 1♂ 27 August 2017, at a lighted window of a house, J. P. O'Connor.

***Limnephilus flavicornis* (Fabricius, 1787)**

CAVAN: Lough Sheelin, Mullaghboy (N4285), 2♂3♀♀ 26-27 July 2017, light-traps, C. McNaughton.

LAOIS: stream near Vicarstown (N5803), 1♀ 3 August 1986 , J. P. O'Connor.

LIMERICK: Curragh Chase Forest Park (R4149), 1♂ 4 October 2016, collected & determined J. Brophy.

WATERFORD: Belle Lake (S6605), 1♂ 17 September 2016, A. Walshe. Kilbarry Bog (S5908), 1♀ 26 August 2019, K. G. M. Bond.

WEXFORD: Johnstown Castle, Garden Lake (T0116), 1♂ 15 August 2017 & Lower Lake (T0216), 2♂♂ 15 August 2017, J. P. O'Connor. Oaklands Lake, New Ross (S7125), 1♂ 17-18 August 2017, J. P. O'Connor & M. A. O'Connor.

Limnephilus flavicornis was recorded from the grounds of Johnstown Castle by King and Halbert (1910).

***Limnephilus griseus* (Linnaeus, 1758)**

GALWAY: Lough Corrib, Hurney's Point (M2531), 1♂ 16 September 2003, light-trap, K. G. M. Bond.

***Limnephilus incisus* Curtis, 1834 New to County Tipperary (Fig. 15)**

OFFALY: Charleville Lake, Tullamore (N3321), 1♂ 6 September 2016, collected & determined J. Brophy.

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), adult 15 July 2019, identified from a photograph, S. Voss.

***Limnephilus lunatus* Curtis, 1834**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 1♂ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

DUBLIN: Castleknock (O0837), 1♀ 29 September 2016, 1♂ 8 October 2016 & 1♂ 19 September 2020, lighted window, suburban house, J. P. O'Connor & M. A. O'Connor. Royal Canal (O0938), 1♂ 6 October 2016, J. P. O'Connor.
GALWAY: Lough Kip River, Oguil, Moycullen (M2231), 1 larva 21 May 2016, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).
MEATH: River Boyne, Trim (N8056), 1♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

A larva was previously taken from the River Boyne near Trim by M. F. O' Grady on the 5 September 1988.
OFFALY: Alderborough, Geashill (N4421), 2♂♂ 17 September 2020, light-trap, B. Sullivan.
ROSCOMMON: Lough Ree, The Warren (N0054), 1♀ 3 September 2016, St John's Wood (N0056), 1♂ 4 September 2016, collected & determined J. Brophy.
WATERFORD: Tramore (S5701), 1♂ 10 September 2016, 125w MV Robinson light-trap, T. Bryant.
WESTMEATH: Robinstown townland, Dalystown, near Mullingar (N4044), ♂ 5 September 2020, light-trap, A. Pedlow.

***Limnephilus luridus* Curtis, 1834 (Fig. 16)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1♂ 17 July 2020 & 1♂ 22 July 2020, at a house, S. Voss.

***Limnephilus marmoratus* Curtis, 1834 (Fig. 17)**

DUBLIN: Royal Canal (O0938), 1♀ 6 October 2016, in a spider's web, J. P. O'Connor. Phibsborough (O1536), 1♂ 9 June 2020, on a wall, J. P. O'Connor.
LIMERICK: Curragh Chase Forest Park (R4149), 1♀ 4 October 2016, collected & determined J. Brophy.
MEATH: River Boyne, Trim (N8056), 1♂2♀♀ 29 July 2020 & 3♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.
OFFALY: near Cushina River (N4816), adult 24 August 2017, collected & determined H. Feeley.
WATERFORD: Ballyscanlan Lough (S5402), 1♀ 4 July 2017, T. Bryant. Belle Lake (S6605), 2♂♂1♀ 3 August 2016, light-trap/swept J. P. O'Connor & M. A. O'Connor. Tramore (S5701), 1♂ 15 September 2016, 125w MV Robinson light-trap, T. Bryant.
WESTMEATH: Robinstown townland, Dalystown, near Mullingar (N4044), ♂♀ 5 September 2020, light-trap, A. Pedlow.
WEXFORD: Castle Lake, Johnstown Castle (T0216), 1♂ 12 August 2017, J. P. O'Connor; Lower Lake, Johnstown Castle (T0216), 1♀ 15 August 2017, J. P. O'Connor. Oaklands Lake, New Ross (S7125), 5♀♀ 7-8 August 2017 & 14♂♂32♀♀ 17-18 August 2017, light-traps, J. P.

O'Connor & M. A. O'Connor. The Burrow, Rosslare (T0918), 1♂ 12 August 2011, swept from vegetation, J. P. O'Connor.

Limnephilus marmoratus was recorded from the grounds of Johnstown Castle by King and Halbert (1910).

***Limnephilus sparsus* Curtis, 1834 (Fig. 18)**

CAVAN: Lough Sheelin, Chambers Bay (N4285), 1♀ 25 June 2020 & 1♀ 17 May 2020, 6 watt light-trap, Mullaghboy, woods (N4385), 2♂♂ 26 July 2017, light-trap, all C. McNaughton.

CORK: Fota Wildlife Park (W7871), 1♂ 4-10 May 2020, Rothamsted Insect Survey light-trap per A. Riley.

Adults were previously recorded from the Wildlife Park with a grid reference of W7874 in O'Connor (2015).

GALWAY: Lough Corrib, Cloonmore (M2241), 2♀♀ 21 May 2016, 15w actinic light-trap, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), adult 25 April 2019, S. Voss, identified by Jürgen Gaul from a photograph, confirmed J. P. O'Connor, adult 5 May 2020, identified from a photograph, 1♀ 26 May 2020 & 1♂ 13 June 2020, on the wall of a shed, S. Voss.

WATERFORD: Tramore (S5701), 1♀ 10 July 2017, 125w MV Robinson light-trap, T. Bryant.

WEXFORD: Oaklands Lake, New Ross (S7125), 1♂ 17-18 August 2017, light-trap, J. P. O'Connor & M. A. O'Connor.

***Limnephilus vittatus* (Fabricius, 1798)**

GALWAY: Kinvarra Point (M3710), 2♀♀ 11 June 2017, C. McNaughton.

***Halesus digitatus* (Schrank, 1781) (Fig. 19)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), adult 18 August 2019, identified from a photograph, 1 larva 28 August 2020, identified from larval remains in a pupal case from a stream, S. Voss.

***Halesus radiatus* (Curtis, 1834) (Fig. 20)**

MEATH: River Boyne, Trim (N8056), 1♂ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

OFFALY: Alderborough, Geashill (N4421), 1♂ 17 September 2020, light-trap, B. Sullivan.

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 2 larvae 14 May 2020, in a small pond, S. Voss.

WATERFORD: Tramore (S5701), 1♂ 8 October 2016 & 1♂ 20 October 2016, 125w MV Robinson light-trap, T. Bryant.

WICKLOW: Killarney Road, Bray (O2517), 1♂ 19 October 2016, collected & determined J. Brophy.

***Mesophylax impunctatus* McLachlan, 1884**

GALWAY: Lough Corrib, Cloonmore (M2241), 4♂♂ 21 May 2016, 15w actinic light-trap, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020).

KERRY: Lough Leane, Golf Course shore, Killarney (V9291), 1♀ 20 October 1994, J. P. O'Connor.

***Micropterna lateralis* (Stephens, 1837) New to County Tipperary (Fig. 21) (Plates 1 and 2)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 3 larvae 13 May 2020, in a small stream, 1♂ 19 May 2020, on a lighted window, 1♂ 27 May 2020, on a window & 1♂ 17 June 2020, on a house wall, S. Voss.

Unusually for this species, the larval cases were composed of small stones (Plates 1 and 2).

WICKLOW: stream/waterfall near Lacken (N9911), 1 larva 22 July 1973, J. P. O'Connor.

***Micropterna sequax* McLachlan, 1875 New to County Tipperary (Fig. 22)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1♀ 12 August 2020, on a window, S. Voss.

WICKLOW: Tinode near Manor Kilbride (O0119), 1♂ 27 August 2017, dead in a spider's web on the window of a house, J. P. O'Connor.

***Potamophylax cingulatus* (Stephens, 1837) New to County Westmeath (Fig. 23)**

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1♂ 15 August 2020, on a lighted window, S. Voss.

WESTMEATH: Robinstown townland, Dalystown, near Mullingar (N4044), ♂ 5 September 2020, light-trap, A. Pedlow.

***Potamophylax latipennis* (Curtis, 1834) (Fig. 24)**

MEATH: River Boyne, Trim (N8056), 1♂1♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

WEXFORD: Glenbough Stream, Ballyhonbeg (T0829), 6 larvae 9 May 2017, D. M. Murray.

***Stenophylax permistus* McLachlan, 1895 (Fig. 25)**

GALWAY: Lough Corrib, Cloonmore (M2241), 1♀ 21 May 2016, collected & determined M. P. Gammell (National Biodiversity Data Centre, 2020). Tarrea (M3613), 1♂ 10 June 2017, C. McNaughton.

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1♀ 23 May 2020, on the wall of a shed & 1♂ 24 May 2020, on the wall of a house, S. Voss.

SERICOSTOMATIDAE

***Sericostoma personatum* (Spence, 1826) (Fig. 26)**

Myles Nolan took a male of *Sericostoma personatum* in a tree-trunk trap at Knockbarron Wood, Kinnity, County Offaly (N1706) on 6 May-5 July 2019. The species was new to that county (Nolan and O'Connor, in press) and is now known from all 32 counties.

CLARE: Cloghaun River near Poulagower (R5984), 1♂ 2 August 2017, collected & determined H. Feeley.

DUBLIN: River Liffey, Strawberry Beds (O0735), 1♂ 25 August 2016, swept on the river bank, J. P. O'Connor & M. A. O'Connor.

KILDARE: River Figile near Rathmore (N6930), 1♀ 2 June 2020, collected & determined H. Feeley.

MAYO: Lough Urlaur (M5089), 1♂ 10 July 2017, collected & determined H. Feeley.

MEATH: River Boyne, Navan South (N8865), 3♂♂ 30 May 1986, J. P. O'Connor, Ramparts, River Boyne, Navan (N8868), 1♀ 22 July 2020, Trim (N8056), 2♂♂1♀ 29 July 2020, J. P. O'Connor & M. A. O'Connor.

SLIGO: Ballyglass, Templeboy (G4429), 1♂ 28 June 2016, collected & determined J. Brophy. Lough Gara (G7101), 1♂ 5 July 2017, collected & determined H. Feeley.

TIPPERARY: River Suir, Carrick on Suir (S3921), 4♂♂1♀ 17 August 2017, J. P. O'Connor & M. A. O'Connor.

BERAEIDAE

***Beraea pullata* (Curtis, 1834) (Fig. 27)**

CAVAN: Lough Sheelin, Chambers Bay (N4285), 1♀ 28 May 2020, gathered on a boat, C. McNaughton.

TIPPERARY: Ballywilliam, Ballyporeen, Cahir (R9009), 1♂ 4 July 2020, on a house door, S. Voss.

ODONTOCERIDAE

***Odontocerum albicorne* (Scopoli, 1763)**

CLARE: Ardcloony River near Ballycorney (R6670), adult 31 July 2017, collected & determined H. Feeley.

DUBLIN: River Liffey, Strawberry Beds (O0735), 1♀ 1 July 2016, swept on the river bank, (O0935), 1♀ 1 July 2016, swept on the river bank, J. P. O'Connor.

WEXFORD: River Boro, Soldier's Hole (S9636), 1♀ 30 July 2016, light-trap, J. P. O'Connor & M. A. O'Connor. Stream at Pollfur Bridge near Fethard (S7806), 2♂♂ 29 July 2016, J. P. O'Connor & M. A. O'Connor.

MOLANNIDAE

***Molanna albicans* (Zetterstedt, 1840) (Fig. 28)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 2♂♂1♀ 12 August 2020, J. P. O'Connor & M. A. O'Connor. Lough Sheelin, Chambers Bay (N4285), 2♂♂ 29 May 2020, 6 watt light-trap, Crover (N4786), 7♂♂3♀♀ 25 June 2020, Kilnahard (N4385), 2♂♂ 5 June 2020 in boat, Mullaghboy (N4285), 1♂ 21 May 2017, light-trap, all C. McNaughton.

WESTMEATH: Lough Sheelin, Lynches Point (N4486), 3♂♂ 29 July 2017, C. McNaughton.

LEPTOCERIDAE

***Athripsodes albifrons* (Linnaeus, 1758) (Fig. 29)**

CARLOW: River Slaney, Kildavin Bridge (S8959), adult, 23 July 2015, collected C. Byrne, identified by S. Dunlop from a photograph (National Biodiversity Data Centre, 2020).

CAVAN: Lough Ramor, Virginia (N6087), 1♂ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

LAOIS: Ballacolla (S3781), adult 6 August 2020, actinic lamp, M. Brennan, identified by S. Flint from a photograph.

MEATH: River Boyne, Trim (N8056), 2♂♂ 29 July 2020, J. P. O'Connor & M. A. O'Connor.

ROSCOMMON: Lough Ree, The Warren (N0054), 1♀ 3 September 2016, collected & determined J. Brophy.

***Athripsodes aterrimus* (Stephens, 1836)**

CAVAN: Lough Sheelin, Kilnahard shore (N4385), 1♂ 5 June 2020, in a boat, C. McNaughton.

***Athripsodes cinereus* (Curtis, 1834) (Fig. 30)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 1♂1♀ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

MEATH: River Boyne, Ramparts, Navan (N8868), 3♀♀ 22 July 2020, Trim (N8056), 12♂♂15♀♀ 29 July 2020, J. P. O'Connor & M. A. O'Connor.

WICKLOW: Pollaphuca (Blessington) Reservoir, Blessington Bridge (N9914), 2♀♀ 6 August 2020, J. P. O'Connor & M. A. O'Connor.

***Athripsodes commutatus* (Rostock, 1874) (Fig. 31)**

CLARE: Lough Derg, Mount Shannon (R7186), 1♂ 26-27 August 2003, light-trap, K. G. M. Bond.

The species was previously known in County Clare from a river near Lough Graney (R5691) and a stream near Spanish Point (R0477).

MEATH: River Boyne, Trim (N8056), 6♂♂16♀♀ 9 September 2020, J. P. O'Connor & M. A. O'Connor.

The second record from County Meath, an adult was previously taken on the River Boyne (N9271), Stackallen, by J. R. Harris in September 1946.

***Ceraclea albimacula* (Rambur, 1842)**

CAVAN: Lough Sheelin, Chambers Bay, (N4285), 1♀ 17 May 2020 & 1♀ 18 May 2020, 6 watt light-trap, Mullaghboy (N4285), 1♂ 27 July 2017, light-trap, all C. McNaughton.

***Ceraclea dissimilis* (Stephens, 1836) New to County Meath (Fig. 32)**

CLARE: Lough Derg, Mount Shannon (R7186), 1♀ 26-27 August 2003, light-trap, K. G. M. Bond.

MEATH: River Boyne, Trim (N8056), 2♀♀ 29 July 2020, J. P. O'Connor & M. A. O'Connor.

***Ceraclea fulva* (Rambur, 1842)**

CLARE: Lough Derg, Mount Shannon (R7186), 5♂♂2♀♀ 26-27 August 2003, light-trap, K. G. M. Bond.

GALWAY: Lough Corrib, Hurney's Point (M2531), 1♀, 28 August 2005, M.V. light-trap, K. G. M. Bond.

KERRY: Muckross Lake, Colleen Baun (Bawn) Rock, Killarney (V9485), 1♀ 27-28 July 1973, light-trap, J. P. O'Connor.

***Ceraclea nigronervosa* (Retzius, 1783)**

CAVAN: Lough Sheelin, Chambers Bay (N4285), 1♂ 7 June 2020, 6 watt light-trap, C. McNaughton.

***Ceraclea senilis* (Burmeister, 1839)**

CLARE: Lough Derg, Mount Shannon (R7186), 1♂ 26-27 August 2003, light-trap, K. G. M. Bond.

***Mystacides azurea* (Linnaeus, 1761) (Fig. 33)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 1♂1♀ 12 August 2020, J. P. O'Connor & M. A. O'Connor. Lough Sheelin, Chambers Bay (N4285), 1♂ 20 May 2020, 6 watt light-trap, Kilnahard shore (N4385), 1♂ 5 June 2020, in a boat, all C. McNaughton.

MEATH: River Boyne, Trim (N8056), 3♂♂3♀♀ 9 September 2020 , J. P. O'Connor & M. A. O'Connor.

TIPPERARY: River Suir, Carrick on Suir (S3921), 5♂♂4♀♀ 17 August 2017, J. P. O'Connor & M. A. O'Connor.

WATERFORD: Ballyscanlan Lough (S5402), 1♂ 2 June 2017, T. Bryant.

***Mystacides longicornis* (Linnaeus, 1758) (Fig. 34)**

ANTRIM: Kebble, Rathlin Island (D0951), adult 20 June 2020, observed & determined H. Watson (NBN Atlas, 2020).

MAYO: Lough Urlaur (M5089), adult 10 July 2017, collected & determined H. Feeley.

WATERFORD: Ballyshunnock Reservoir (S4509), 9♂♂ 13 August 2017, swarming on the reservoir, J. P. O'Connor & M. A. O'Connor.

***Oecetis furva* (Rambur, 1842)**

CAVAN: Lough Sheelin, Chambers Bay, (N4285), 1♂ 18 May 2020, 6 watt light-trap, Mullaghboy (N4285), 1♂2♀♀ 26-27 July 2017, light-trap at harbour, all C. McNaughton.

CLARE: Lough Derg, Mount Shannon (R7186), 1♀ 26-27 August 2003, light-trap, K. G. M. Bond.

WESTMEATH: Lough Sheelin, Lynches Point (N4486), 1♀ 29 July 2017, C. McNaughton.

***Oecetis lacustris* (Pictet, 1834)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 1♀ 12 August 2020, J. P. O'Connor & M. A. O'Connor. Lough Sheelin, Chambers Bay (N4285), 1♀ 25 June 2020, 6 watt light-trap, C. McNaughton.

***Oecetis notata* (Rambur, 1842) New to County Meath (Fig. 35)**

MEATH: River Boyne, Ramparts, Navan (N8868), 4♂♂2♀♀ 22 July 2020, J. P. O'Connor & M. A. O'Connor.

The discovery of *Oecetis notata* on the River Boyne is of interest as Wallace and O'Connor (2020) discuss the resurgence of this caddisfly in Britain and Ireland.

***Oecetis ochracea* (Curtis, 1825) (Fig. 36)**

CAVAN: Lough Ramor, Lakeside Manor (N6286), 3♂♂2♀♀ 12 August 2020, J. P. O'Connor & M. A. O'Connor.

GALWAY: Kinvarra Point (M3710), 1♂ 11 June 2017, C. McNaughton.

***Triaenodes bicolor* (Curtis, 1834)**

WATERFORD: Belle Lake (S6605), 1♂ 3 August 2016, light-trap, J. P. O'Connor & M. A. O'Connor.

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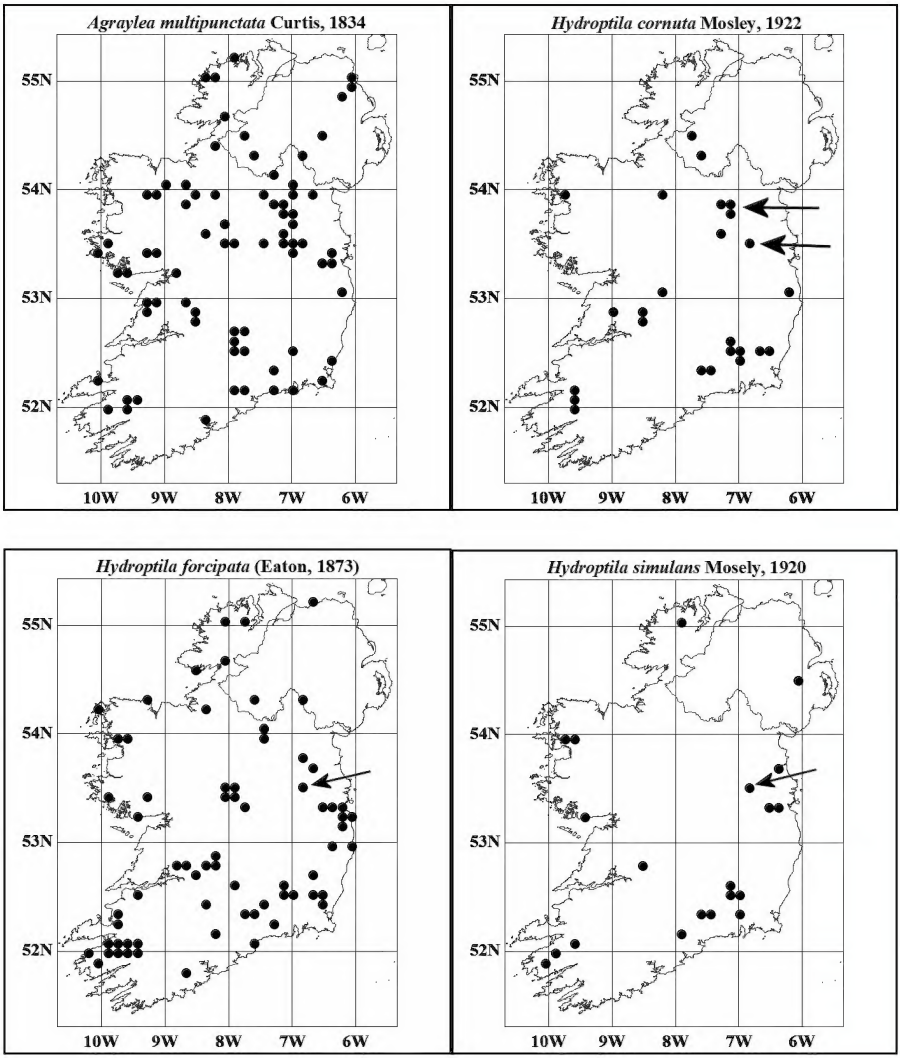
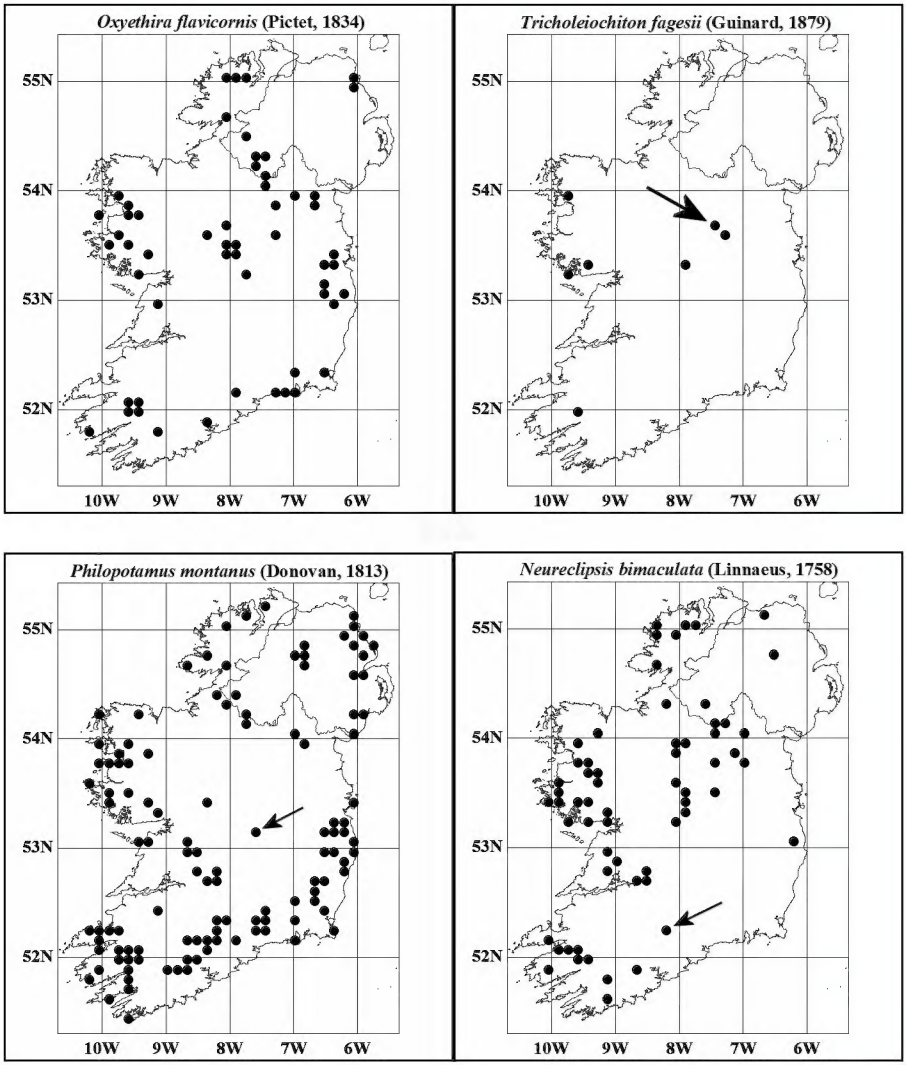
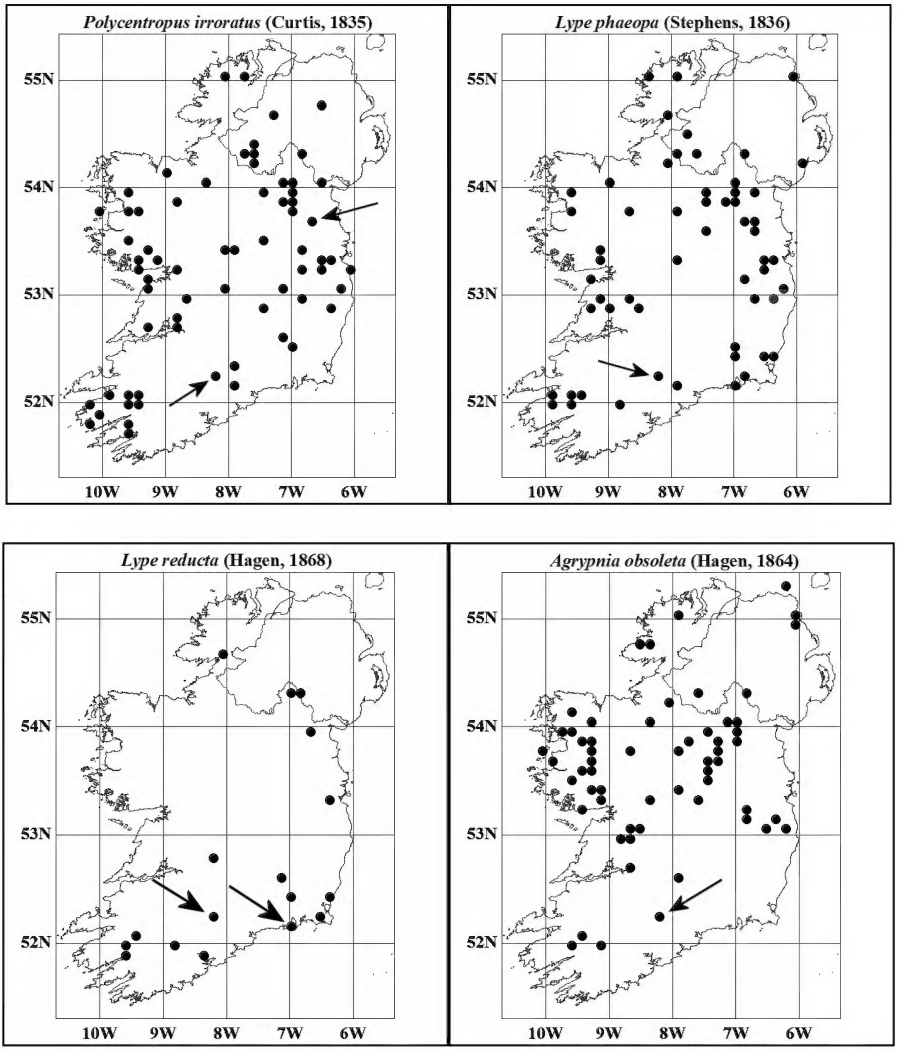


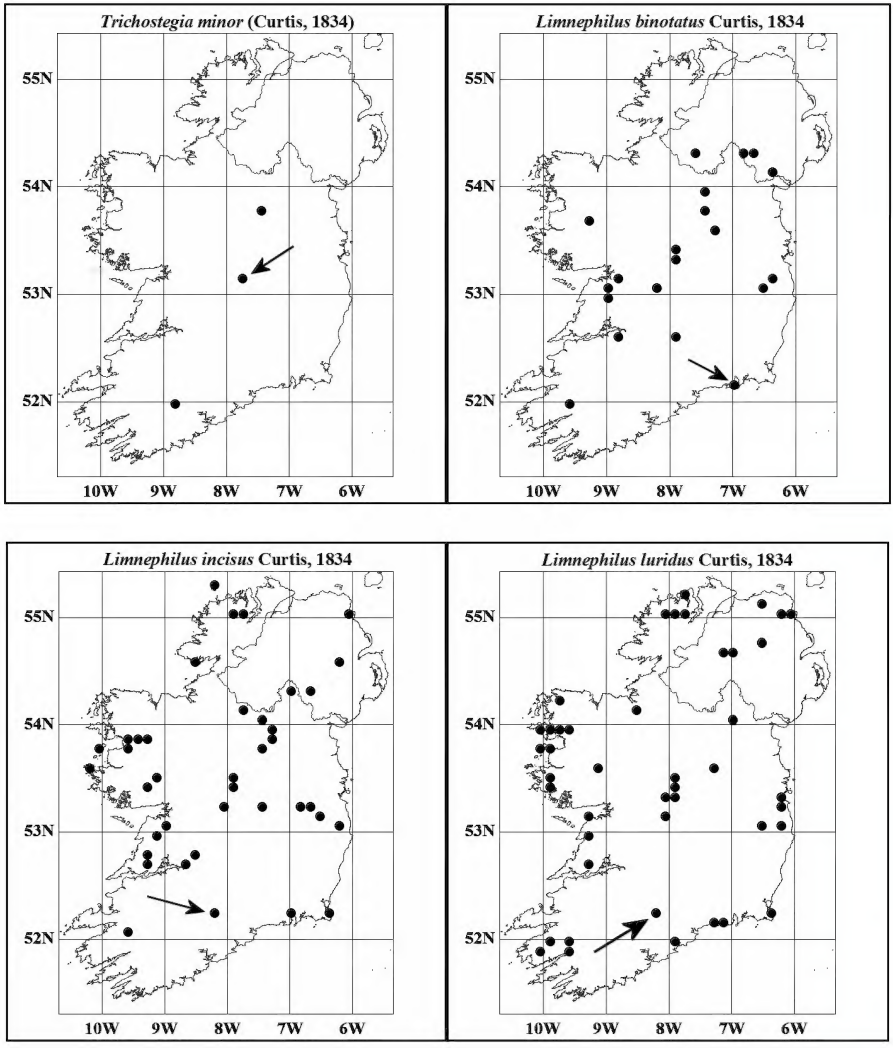
FIGURES 1-4. The known Irish distributions of *Agraylea multipunctata* Curtis, 1834, *Hydroptila cornuta* Mosley, 1922, *Hydroptila forcipata* (Eaton, 1873) and *Hydroptila simulans* Mosely, 1920. Significant records are indicated by arrows.



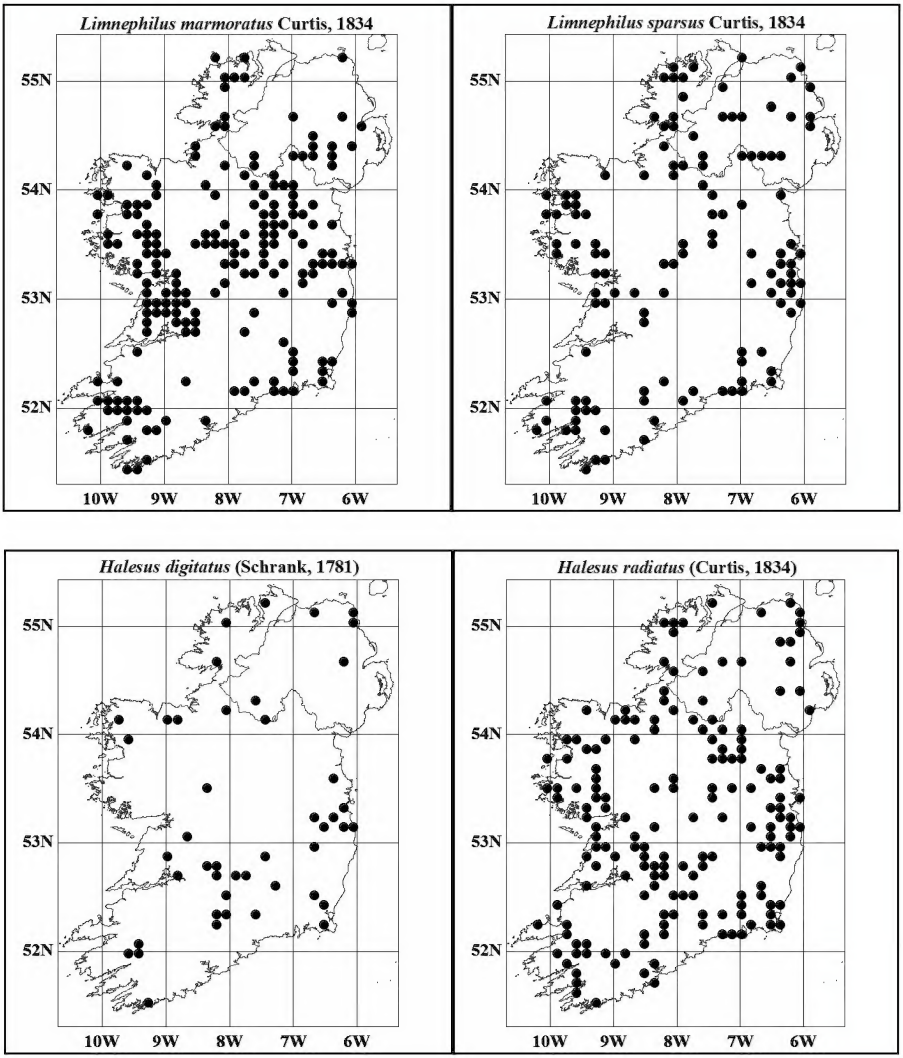
FIGURES 5-8. The known Irish distributions of *Oxyethira flavicornis* (Pictet, 1834), *Tricholeiochiton fagesii* (Guinard, 1879), *Philopotamus montanus* (Donovan, 1813) and *Neureclipsis bimaculata* (Linnaeus, 1758). Significant records are indicated by arrows.



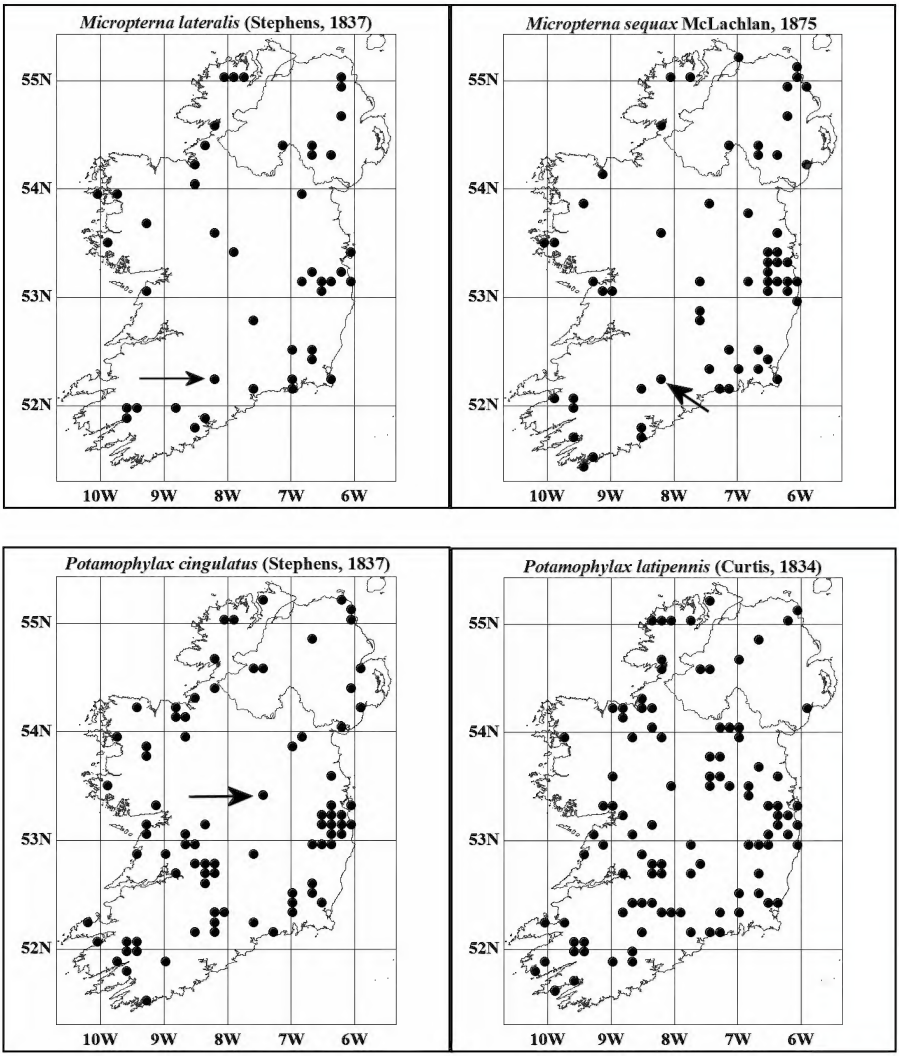
FIGURES 9-12. The known Irish distributions of *Polycentropus irroratus* (Curtis, 1835), *Lype phaeopa* (Stephens, 1836), *Lype reducta* (Hagen, 1868) and *Agrypnia obsoleta* (Hagen, 1864). Significant records are indicated by arrows.



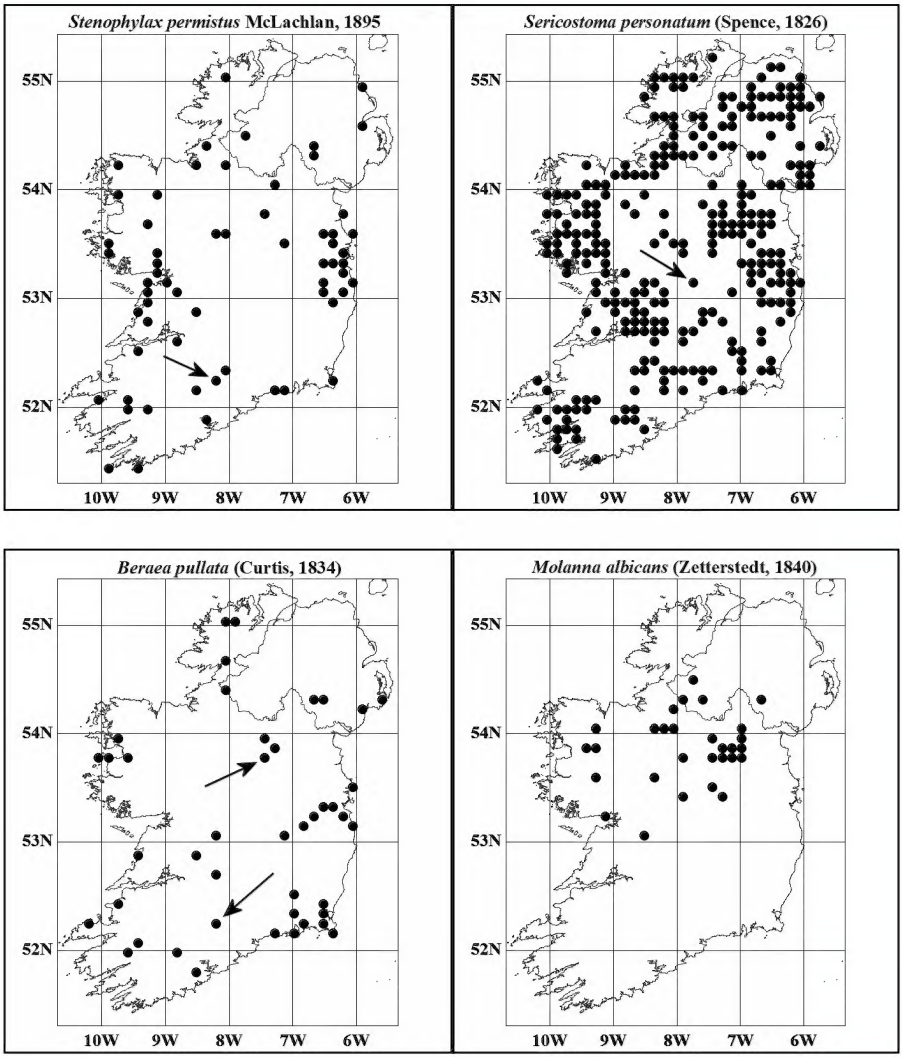
FIGURES 13-16. The known Irish distributions of *Trichostegia minor* (Curtis, 1834), *Limnephilus binotatus* Curtis, 1834, *Limnephilus incisus* Curtis, 1834 and *Limnephilus luridus* Curtis, 1834. Significant records are indicated by arrows.



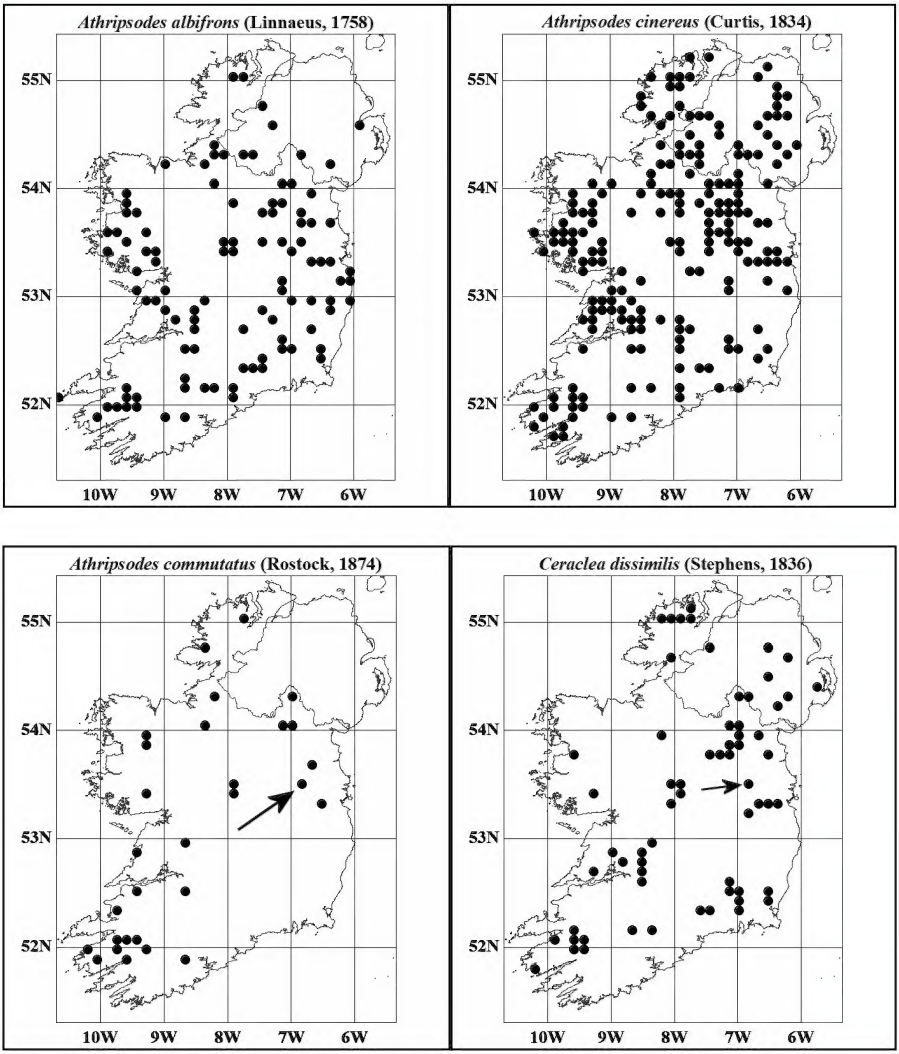
FIGURES 17-20. The known Irish distributions of *Limnephilus marmoratus* Curtis, 1834, *Limnephilus sparsus* Curtis, 1834, *Halesus digitatus* (Schrank, 1781) and *Halesus radiatus* (Curtis, 1834).



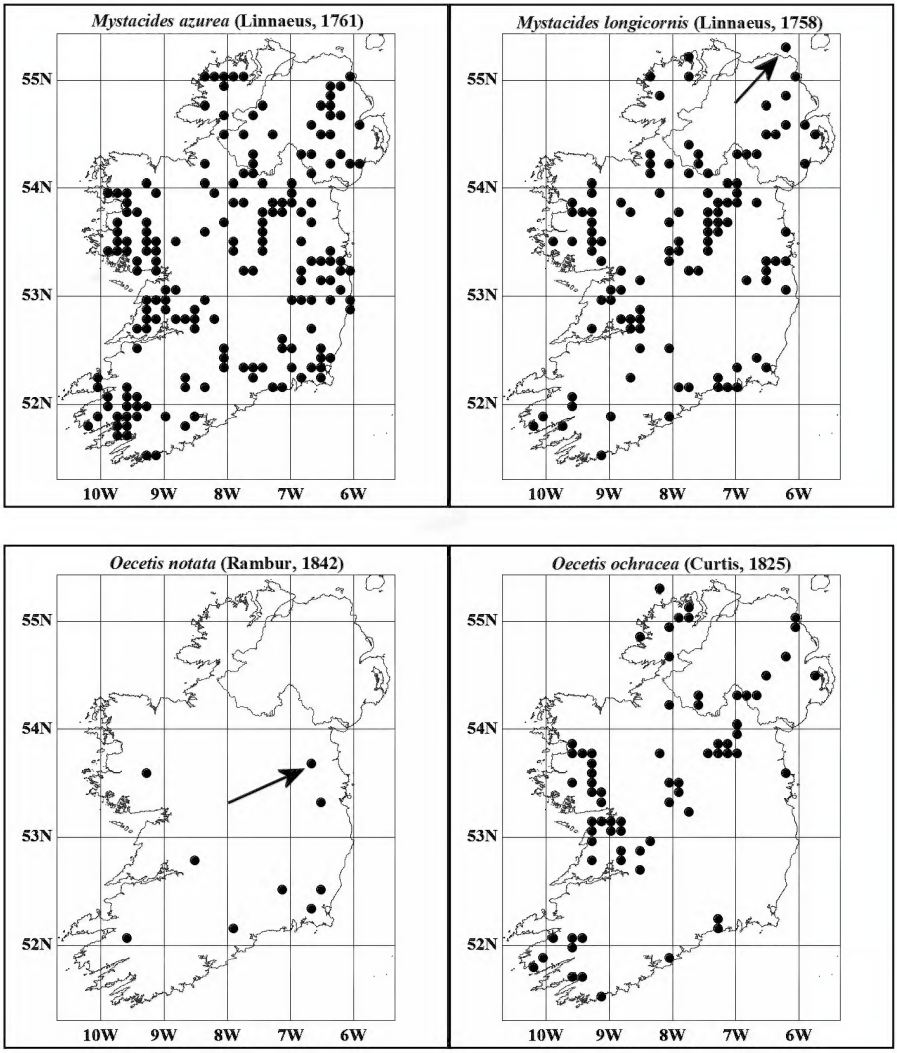
FIGURES 21-24. The known Irish distributions of *Micropterna lateralis* (Stephens, 1837), *Micropterna sequax* McLachlan, 1875, *Potamophylax cingulatus* (Stephens, 1837) and *Potamophylax latipennis* (Curtis, 1834). Significant records are indicated by arrows.



FIGURES 25-28. The known Irish distributions of *Stenophylax permistus* McLachlan, 1895, *Sericostoma personatum* (Spence, 1826), *Beraea pullata* (Curtis, 1834) and *Molanna albicans* (Zetterstedt, 1840). Significant records are indicated by arrows.



FIGURES 29-32. The known Irish distributions of *Athripsodes albifrons* (Linnaeus, 1758), *Athripsodes cinereus* (Curtis, 1834), *Athripsodes commutatus* (Rostock, 1874) and *Ceraclea dissimilis* (Stephens, 1836). Significant records are indicated by arrows.



FIGURES 33-36. The known Irish distribution of *Mystacides azurea* (Linnaeus, 1761), *Mystacides longicornis* (Linnaeus, 1758), *Oecetis notata* (Rambur, 1842) and *Oecetis ochracea* (Curtis, 1825). Significant records are indicated by arrows.

PLATE 1. *Micropterna lateralis*, larva in a small stream, Ballywilliam, County Tipperary, 6 May 2020. Photograph © Sylvia Voss.

PLATE 2. Ballywilliam, County Tipperary, part of the small stream containing the larvae of *Micropterna lateralis*. Photograph © Sylvia Voss.

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AMENDMENTS AND CLARIFICATION OF SOME SITE DETAILS IN DISTRIBUTION RECORDS OF IRISH CHIRONOMIDAE (DIPTERA), PARTS 1 - 3

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Abstract

Site reference details are amended for 20 locations cited in "Distribution Records of Irish Chironomidae (Diptera)" published in Volumes 37, 38 and 39 of the *Bulletin of the Irish Biogeographical Society*. A list of the species of Chironomidae on record from each location is provided. Amendments are given for sites in Counties Clare, Cork, Dublin, Galway, Kerry, Kildare, Limerick, Mayo (Clare Island), Offaly, Roscommon, Tipperary, Tyrone and Wicklow in Hydrometric Areas 1, 9, 10, 15, 20, 22, 24, 25, 26.

Key words: Distribution records, corrections, grid references, Chironomidae, Ireland.

Introduction

Since publication of distribution records of species of Chironomidae in Ireland (Murray *et al.*, 2013, 2014, 2015), from a database of over 22,000 records from collections at almost 1,500 sites maintained by the senior author, corrections of grid references for three sites were given in Murray *et al.* (2017). It has recently been brought to our attention that location details for some other sites were also inaccurate. These inaccuracies are addressed here. Amended grid references and an inventory of the species known to occur at 20 locations are provided.

Amendments

In the following account, references made to records in the subfamilies Podonominae, Tanypodinae, Diamesinae and Prodiamesinae are from Murray *et al.* (2013). References to

records in the Subfamily Orthocladiinae are from Murray *et al.* (2014) while those in the subfamily Chironominae - Tribes Chironomini, Pseudochironomini and Tanytarsini are from Murray *et al.* (2015). Clarification or correction of location details are given for 20 sites in Counties Clare, Cork, Dublin, Galway, Kerry, Kildare, Limerick, Mayo (Clare Island), Offaly, Roscommon, Tipperary, Tyrone and Wicklow in Hydrometric Areas 1, 9, 10, 15, 20, 22, 24, 25 and 26. Amendments made to grid reference numbers are highlighted in **bold** text.
Abbreviations used: IGR - Irish Grid Reference; HA - Hydrometric Area.

CLARE, HA25: River Shannon (Lough Derg), Killaloe, IGR R705715

The sub-zone prefix letter "M" was applied in error to the IGR number in Murray *et al.* (2013, 2014, 2015). The correct character prefix is "**R**" and the reference "M705715" is amended to read **R**705715**.** The following species are on record:
Tanypodinae: *Ablabesmyia* (*Ablabesmyia*) *longistyla* Fittkau, 1962, *Arctopelopia barbitarsis* (Zetterstedt, 1850), *Conchapelopia* (*Conchapelopia*) *hittmairorum* Michiels & Spies, 2002, *Macropelopia* (*Macropelopia*) *nebulosa* (Meigen, 1804), *Procladius* (*Holotanypus*) *choreus* (Meigen, 1804), *Procladius* (*H.*) Pe3 sensu Langton & Visser, 2003.
Diamesinae: *Potthastia gaedii* (Meigen, 1838).
Prodiamesinae: *Prodiamesa olivacea* (Meigen, 1818).
Orthocladiinae: *Orthocladius* (*Orthocladius*) *oblidens* (Walker, 1856), *Orthocladius* (*Symposiocladius*) *holsatus* Goetghebuer, 1937, *Paracladius conversus* (Walker, 1856), *Parakiefferiella coronata* (Edwards, 1929), *Paratrissocladius excerptus* (Walker, 1856), *Psectrocladius* (*Allopsectrocladius*) *obvius* (Walker, 1856), *Psectrocladius* (*Psectrocladius*) *sordidellus* (Zetterstedt, 1838), *Rheocricotopus* (*Rheocricotopus*) *fuscipes* (Kieffer, 1909), *Synorthocladius semivirens* (Kieffer, 1909), *Tvetenia verralli* (Edwards, 1929).
Chironominae - Chironomini: *Dicrotendipes pulsus* (Walker, 1856), *Parachironomus cinctellus* (Goetghebuer, 1921), *Parachironomus vitiosus* (Goetghebuer, 1921).
Chironominae - Pseudochironomini: *Pseudochironomus prasinatus* (Staeger, 1839).
Chironominae - Tanytarsini: *Cladotanytarsus atridorsum* Kieffer, 1924, *Micropsectra atrofasciata* (Kieffer, 1911), *Paratanytarsus bituberculatus* (Edwards, 1929), *Paratanytarsus inopertus* (Walker, 1856), *Paratanytarsus tenuis* (Meigen, 1830).

CORK, HA20: River Bandon, Ballineen Bridge IGR W344538

The six-figure IGR number for Ballineen Bridge given as "W434538" in Murray *et al.* (2013, 2014, 2015) is amended to W**34**4538**.** The following species are on record:
Tanypodinae: *Ablabesmyia* (*Ablabesmyia*) *longistyla* Fittkau, 1962, *Conchapelopia* (*Conchapelopia*) *pallidula* (Meigen, 1818), *Conchapelopia* (*C.*) *viator* (Kieffer, 1911),

Macropelopia (*Macropelopia*) *adaucta* Kieffer, 1916, *Macropelopia* (*M.*) *nebulosa* (Meigen, 1804), *Rheopelopia maculipennis* (Zetterstedt, 1838), *Thienemannimyia* (*Thienemannimyia*) *pseudocarnea* Murray, 1976, *Trissopelopia longimana* (Staeger, 1839), *Zavrelimyia* (*Paramerina*) *divisa* (Walker, 1856).

Prodiamesinae: *Prodiamesa olivacea* (Meigen, 1818).

Orthocladiinae: *Brillia bifida* (Kieffer, 1909), *Brillia longifurca* Kieffer, 1921, *Cricotopus* (*Cricotopus*) *bicinctus* (Meigen, 1818), *Cricotopus* (*C.*) *curtus* Hirvenoja, 1973, *Cricotopus* (*C.*) *tremulus* (Linnaeus, 1758), *Cricotopus* (*C.*) *triannulatus* (Macquart, 1826), *Cricotopus* (*C.*) *trifascia* Edwards, 1929, *Cricotopus* (*C.*) *tristis* Hirvenoja, 1973, *Eukiefferiella claripennis* (Lundbeck, 1898), *Eukiefferiella clypeata* (Thienemann, 1919), *Eukiefferiella devonica* (Edwards, 1929), *Eukiefferiella dittmari* Lehmann, 1972, *Eukiefferiella ilkleyensis* (Edwards, 1929), *Heterotanytarsus apicalis* (Kieffer, 1921), *Heterotrissocladius marcidus* (Walker, 1856), *Nanocladius* (*Nanocladius*) *rectinervis* (Kieffer, 1911), *Orthocladius* (*Euorthocladius*) *ashei* Soponis, 1990, *Orthocladius* (*E.*) *rivulorum* Kieffer, 1909, *Orthocladius* (*Orthocladius*) *rubicundus* (Meigen, 1818), *Parametriocnemus stylatus* (Spärck, 1923), *Paratrissocladius excerptus* (Walker, 1856), *Rheocricotopus* (*Rheocricotopus*) *fuscipes* (Kieffer, 1909), *Synorthocladius semivirens* (Kieffer, 1909), *Tvetenia calvescens* (Edwards, 1929), *Tvetenia discoloripes* (Goetghebuer & Thienemann, 1936).

Chironominae - Chironomini: *Microtendipes rydalensis* (Edwards, 1929), *Xenochironomus xenolabis* (Kieffer, 1916).

Chironominae - Tanytarsini: *Rheotanytarsus pentapoda* (Kieffer, 1909).

CORK, HA20: River Bandon, Long Bridge, Dunmanway, IGR W241531

The IGR number given for Long Bridge as "W242631" in Murray *et al.* (2013, 2014, 2015) is amended to W24**15**31**.** The following species are on record:

Tanypodinae: *Ablabesmyia* (*Ablabesmyia*) *longistyla* Fittkau, 1962, *Ablabesmyia* (*A*) *monilis* (Linnaeus, 1758), *Conchapelopia* (*Conchapelopia*) *melanops* (Meigen, 1818), *Conchapelopia* (*C.*) *viator* (Kieffer, 1911), *Macropelopia* (*Macropelopia*) *nebulosa* (Meigen, 1804), *Nilotanypus dubius* (Meigen, 1804), *Rheopelopia maculipennis* (Zetterstedt, 1838), *Thienemannimyia* (*Thienemannimyia*) *pseudocarnea* Murray, 1976, *Trissopelopia longimana* (Staeger, 1839), *Zavrelimyia* (*Paramerina*) *divisa* (Walker, 1856).

Prodiamesinae: *Prodiamesa olivacea* (Meigen, 1818).

Orthocladiinae: *Brillia bifida* (Kieffer, 1909), *Brillia longifurca* Kieffer, 1921, *Cricotopus* (*Cricotopus*) *albiforceps* (Kieffer, 1916), *Cricotopus* (*C.*) *bicinctus* (Meigen, 1818), *Cricotopus* (*C.*) *similis* Goetghebuer, 1921, *Cricotopus* (*C.*) *trifascia* Edwards, 1929, *Cricotopus* (*Nostococladius*) *lygropis* Edwards, 1929, *Eukiefferiella claripennis* (Lundbeck, 1898),

Eukiefferiella clypeata (Thienemann, 1919), *Eukiefferiella devonica* (Edwards, 1929), *Eukiefferiella dittmari* Lehmann, 1972, *Eukiefferiella ilkleyensis* (Edwards, 1929), *Eurycnemus crassipes* (Meigen, 1810), *Heterotanytarsus apicalis* (Kieffer, 1921), *Heterotrissocladius marcidus* (Walker, 1856), *Nanocladius* (*Nanocladius*) *rectinervis* (Kieffer, 1911), *Orthocladius* (*Euorthocladius*) *ashei* Soponis, 1990, *Orthocladius* (*E.*) *rivulorum* Kieffer, 1909, *Orthocladius* (*Orthocladius*) *rubicundus* (Meigen, 1818), *Parametriocnemus stylatus* (Spärck, 1923), *Psectrocladius* (*Psectrocladius*) *psilopterus* (Kieffer, 1906), *Rheocricotopus* (*Psilocricotopus*) *chalybeatus* (Edwards, 1929), *Rheocricotopus* (*Rheocricotopus*) *fuscipes* (Kieffer, 1909), *Synorthocladius semivirens* (Kieffer, 1909), *Tvetenia calvescens* (Edwards, 1929), *Tvetenia discoloripes* (Goetghebuer & Thienemann, 1936).

Chironominae - Chironomini: *Microtendipes rydalensis* (Edwards, 1929).

Chironominae - Tanytarsini: *Rheotanytarsus pellucidus* (Walker, 1848), *Rheotanytarsus pentapoda* (Kieffer, 1909).

CORK, HA20: River Ovane, Pierson's Bridge, IGR W023544

The six-figure grid reference number for Pierson's Bridge was erroneously cited as "W023454" in Murray *et al.* (2013, 2014, 2015) whereas the correct reference is W023**54**4. The following species are on record:

Tanypodinae: *Ablabesmyia* (*Ablabesmyia*) *monilis* (Linnaeus, 1758), *Conchapelopia* (*Conchapelopia*) *viator* (Kieffer, 1911), *Rheopelopia eximia* (Edwards, 1929).

Orthocladiinae: *Cricotopus* (*Cricotopus*) *albiforceps* (Kieffer, 1916), *Cricotopus* (*C.*) *annulator* Goetghebuer, 1927, *Cricotopus* (*C.*) *bicinctus* (Meigen, 1818), *Cricotopus* (*C.*) *cylindraceus* (Kieffer, 1908), *Krenosmittia camptophleps* (Edwards, 1929), *Orthocladius* (*Orthocladius*) *rubicundus* (Meigen, 1818), *Parakiefferiella bathophila* (Kieffer, 1912), *Parametriocnemus stylatus* (Spärck, 1923), *Psectrocladius* (*Psectrocladius*) *psilopterus* (Kieffer, 1906), *Rheocricotopus* (*Psilocricotopus*) *chalybeatus* (Edwards, 1929), *Synorthocladius semivirens* (Kieffer, 1909), *Thienemanniella vittata* (Edwards, 1924).

Chironominae - Chironomini: *Demicryptochironomus* (*Demicryptochironomus*) *vulneratus* (Zetterstedt, 1838), *Microtendipes rydalensis* (Edwards, 1929), *Paracladopelma camptolabis* (Kieffer, 1913), *Phaenopsectra flavipes* (Meigen, 1818), *Phaenopsectra* sp pe "Bala" ?*punctipes*? sensu Langton & Visser, 2003, *Polypedilum* (*Polypedilum*) *albicorne* (Meigen, 1838), *Polypedilum* (*P.*) *nubeculosum* (Meigen, 1804).

Chironominae - Tanytarsini: *Cladotanytarsus vanderwulpi* (Edwards, 1929), *Paratanytarsus inopertus* (Walker, 1856), *Rheotanytarsus pentapoda* (Kieffer, 1909), *Tanytarsus brundini* Lindeberg, 1963, *Tanytarsus eminulus* (Walker, 1856), *Tanytarsus heusdensis* Goetghebuer, 1923.

DUBLIN, HA9: Woodview pond and temporary pool, UCD, IGR O185303

The six-figure IGR number for this location, on the campus of University College Dublin, was given in error as "O185203" in Murray *et al.* (2014) and as "O186203" in Murray *et al.*, (2013, 2015). The amended grid reference is O18**53**03. The following species are on record:
Tanypodinae: *Apsectrotanypus trifascipennis* (Zetterstedt, 1838), *Psectrotanypus varius* (Fabricius, 1787).
Orthocladiinae: *Psectrocladius* (*Allopsectrocladius*) *obvius* (Walker, 1856), *Psectrocladius* (*Psectrocladius*) *limbatellus* (Holmgren, 1869).
Chironominae - Chironomini: *Chironomus* (*Chironomus*) *luridus* Strenzke, 1959, *Phaenopsectra flavipes* (Meigen, 1818).

GALWAY, HA25: Lough Derg, Woodford, IGR R794964

The sub-zone letter "M" was applied in error to the IGR number (instead of R) in Murray *et al.* (2013, 2014, 2015). The reference "M794964" should read **R**794964**.** The following species are listed:
Tanypodinae: *Ablabesmyia* (*Ablabesmyia*) *longistyla* Fittkau, 1962, *Apsectrotanypus trifascipennis* (Zetterstedt, 1838), *Conchapelopia* (*Conchapelopia*) *melanops* (Meigen, 1818), *Procladius* (*Holotanypus*) *sagittalis* (Kieffer, 1909), *Procladius* (*Psilotanypus*) *rufovittatus* (van der Wulp, 1874), *Tanypus* (*Tanypus*) *vilipennis* (Kieffer, 1918).
Diamesinae: *Potthastia gaedii* (Meigen, 1838).
Orthocladiinae: *Cricotopus* (*Cricotopus*) *annulator* Goetghebuer, 1927, *Cricotopus* (*C.*) *bicinctus* (Meigen, 1818), *Cricotopus* (*C.*) *festivellus* (Kieffer, 1906), *Cricotopus* (*Isocladius*) *intersectus* (Staeger, 1839), *Cricotopus* (*I.*) *obnixus* (Walker, 1856), *Cricotopus* (*I.*) *reversus* Hirvenoja, 1973, *Cricotopus* (*I.*) *sylvestris* (Fabricius, 1794), *Cricotopus* (*Paratrichocladius*) *rufiventris* (Meigen, 1830), *Orthocladius* (*Eudactylocladius*) *fuscimanus* (Kieffer, 1908), *Orthocladius* (*Orthocladius*) *glabripennis* (Goetghebuer, 1921), *Orthocladius* (*O.*) *oblidens* (Walker, 1856), *Orthocladius* (*O.*) *pedestris* Kieffer, 1909, *Orthocladius* (*O.*) *rubicundus* (Meigen, 1818), *Orthocladius* (*Pogonocladius*) *consobrinus* (Holmgren, 1869), *Psectrocladius* (*Allopsectrocladius*) *obvius* (Walker, 1856), *Psectrocladius* (*Psectrocladius*) *oxyura* Langton, 1985, *Psectrocladius* (*Psectrocladius*) *sordidellus* (Zetterstedt, 1838).
Chironominae - Chironomini: *Demicryptochironomus* (*Demicryptochironomus*) *vulneratus* (Zetterstedt, 1838), *Dicrotendipes nervosus* (Staeger, 1839), *Endochironomus tendens* (Fabricius, 1775), *Glyptotendipes* (*Glyptotendipes*) *cauliginellus* (Kieffer, 1913), *Glyptotendipes* (*G.*) *glaucus* (Meigen, 1818), *Kiefferulus* (*Kiefferulus*) *tendipediformis* (Goetghebuer, 1921), *Paratendipes albimanus* (Meigen, 1818), *Polypedilum* (*Polypedilum*)

nubeculosum (Meigen, 1804), *Polypedilum* (*Uresipedilum*) *convictum* (Walker, 1856), *Tribelos intextum* (Walker, 1856).

Chironominae - Tanytarsini: *Cladotanytarsus atridorsum* Kieffer, 1924, *Cladotanytarsus mancus* (Walker, 1856), *Micropsectra apposita* (Walker, 1856), *Paratanytarsus inopertus* (Walker, 1856), *Stempellina bausei* (Kieffer, 1911), *Tanytarsus bathophilus* Kieffer, 1911, *Tanytarsus brundini* Lindeberg, 1963, *Tanytarsus gregarius* Kieffer, 1909, *Tanytarsus mendax* Kieffer, 1925.

KERRY, HA22: River Laune, Killorglin, IGR V787952

The six-figure IGR number was erroneously cited as "V952787" in Murray *et al.* (2014) whereas the correct reference is V**787952** (the easting and northern coordinates were mistakenly transposed). One species is on record for this site:

Orthocladiinae: *Orthocladius* (*Euorthocladius*) *rivicola* Kieffer, 1911.

KERRY, HA22: Lough Annascaul, Dingle Penninsula, IGR Q589052

The six-figure IGR number as "Q589152" in Murray *et al.* (2015) is amended to Q589**0**52**.** One species is on record for this site:

Chironominae - Chironomini: *Chironomus* (*Chironomus*) *anthracinus* Zetterstedt, 1860.

KILDARE, HA9: River Rye, Leixlip, IGR N993370

The six-figure IGR number given as "N933370" in Murray *et al.* (2014) is amended to N9**9**3370**.** Four species are on record:

Orthocladiinae: *Orthocladius* (*Euorthocladius*) *rivicola* Kieffer, 1911, *Orthocladius* (*Orthocladius*) *oblidens* (Walker, 1856), *Orthocladius* (*Pogonocladius*) *consobrinu*s (Holmgren, 1869), *Thienemanniella vittata* (Edwards, 1924).

LIMERICK, HA24: Lough Gur, Holycross, IGR R646403

The six-figure IGR number was erroneously cited for six of the 17 species records for Lough Gur as "R646269" in Murray *et al.* (2014, 2015). The correct reference is R646**403** for these six species, collected as pupal exuviae along the south shore of Lough Gur:

Orthocladiinae: *Parakiefferiella bathophila* (Kieffer, 1912).

Chironominae - Chironomini: *Chironomus* (*Chironomus*) *tentans* Fabricius, 1805, *Glyptotendipes* (*Caulochironomus*) *scirpi* (Kieffer, 1915), *Glyptotendipes* (*Glyptotendipes*) *cauliginellus* (Kieffer, 1913), *Glyptotendipes* (*G.*) *pallens* (Meigen, 1804), *Parachironomus parilis* (Walker, 1856).

MAYO, Clare Island: Lough Poirtin Fuinch, IGR L706857

Records of 28 species are cited for Lough Poirtin Fuinch, Clare Island, in Murray *et al.* (2013, 2014, 2015). Unfortunately, the incorrect IGR L706285 instead of L706**857** was mistakenly cited for one species of Chironominae in Murray *et al.* (2015):

Chironominae - Chironomini: *Dicrotendipes nervosus* (Staeger, 1839).

OFFALY, HA25: Derryadd Lough, Ferbane, IGR N110240

The six-figure IGR number cited as "N100240" in Murray *et al.* (2015) is amended to N1**1**0240. One species is on record:

Chironominae - Chironomini: *Chironomus* (*Chironomus*) *tentans* Fabricius, 1805.

OFFALY, HA25: River Brosna, Cloghan, IGR N046209

The sub-zone prefix letter "M" was applied instead of "N" for the IGR given as M046209 in Murray *et al.* (2013, 2014, 2015). The correct IGR for this site at Cloghan is **N**046209. The following species are listed:

Diamesinae: *Potthastia gaedii* (Meigen, 1838).

Orthocladiinae: *Brillia longifurca* Kieffer, 1921, *Cricotopus* (*Cricotopus*) *annulator* Goetghebuer, 1927, *Cricotopus* (*C.*) *bicinctus* (Meigen, 1818), *Cricotopus* (*C.*) *trifascia* Edwards, 1929, *Eukiefferiella dittmari* Lehmann, 1972, *Eukiefferiella ilkleyensis* (Edwards, 1929), *Orthocladius* (*Orthocladius*) *oblidens* (Walker, 1856), *Orthocladius* (*O.*) *rubicundus* (Meigen, 1818), *Parametriocnemus stylatus* (Spärck, 1923), *Rheocricotopus* (*Psilocricotopus*) *chalybeatus* (Edwards, 1929), *Tvetenia calvescens* (Edwards, 1929).

Chironominae - Chironomini: *Polypedilum* (*Uresipedilum*) *convictum* (Walker, 1856), *Polypedilum* (*U.*) *cultellatum* Goetghebuer, 1931.

Chironominae - Tanytarsini: *Tanytarsus brundini* Lindeberg, 1963, *Tanytarsus eminulus* (Walker, 1856).

ROSCOMMON, HA26: River Suck, Athleague, IGR M825578

The six-figure grid reference number was erroneously cited as "M825758" in Murray *et al.* (2013, 2014, 2015) whereas the correct reference is M825**7**8. The following species are on record:

Tanypodinae: *Conchapelopia* (*Conchapelopia*) *viator* (Kieffer, 1911), *Nilotanypus dubius* (Meigen, 1804), *Thienemannimyia* (*Thienemannimyia*) *pseudocarnea* Murray, 1976.

Orthocladiinae: *Cricotopus* (*Cricotopus*) *annulator* Goetghebuer, 1927, *Cricotopus* (*C.*) *bicinctus* (Meigen, 1818), *Cricotopus* (*C.*) *triannulatus* (Macquart, 1826), *Cricotopus* (*C.*) *trifascia* Edwards, 1929, *Eukiefferiella claripennis* (Lundbeck, 1898), *Eukiefferiella ilkleyensis*

(Edwards, 1929), *Heleniella ornaticollis* (Edwards, 1929), *Nanocladius* (*Nanocladius*) *rectinervis* (Kieffer, 1911), *Orthocladius* (*Eudactylocladius*) *fuscimanus* (Kieffer, 1908), *Orthocladius* (*Orthocladius*) *oblidens* (Walker, 1856), *Orthocladius* (*O.*) *rubicundus* (Meigen, 1818), *Parakiefferiella bathophila* (Kieffer, 1912), *Parametriocnemus stylatus* (Spärck, 1923), *Paratrissocladius excerptus* (Walker, 1856), *Rheocricotopus* (*Psilocricotopus*) *chalybeatus* (Edwards, 1929), *Synorthocladius semivirens* (Kieffer, 1909), *Tvetenia calvescens* (Edwards, 1929), *Tvetenia verralli* (Edwards, 1929).

Chironominae - Chironomini: *Paratendipes nudisquama* (Edwards, 1929), *Polypedilum* (*Tripodura*) *pullum* (Zetterstedt, 1838), *Polypedilum* (*Uresipedilum*) *convictum* (Walker, 1856), *Xenochironomus xenolabis* (Kieffer, 1916).

Chironominae - Tanytarsini: *Micropsectra pallidula* (Meigen, 1830), *Rheotanytarsus pentapoda* (Kieffer, 1909), *Tanytarsus bathophilus* Kieffer, 1911, *Tanytarsus brundini* Lindeberg, 1963.

TIPPERARY, HA15: River Nore, Bridge on N62, IGR S133816 (not "Nore Bridge")

The IGR S133816 for this site on the River Nore, and used by Murray *et al.* (2013, 2014, 2015), was correctly given by Hayes (1991) for his collections on the upper reaches of the River Nore, at a bridge on road N62, south of Roscrea. However, Hayes (*loc. cit.*) incorrectly referred to this site as "Nore Bridge" rather than "Bridge over the River Nore" (The bridge generally called Nore Bridge is situated approximately 8km north-east of the present site at IGR S173856). The following species are on record:

Diamesinae: *Potthastia gaedii* (Meigen, 1838), *Potthastia longimanus* Kieffer, 1922.

Prodiamesinae: *Prodiamesa olivacea* (Meigen, 1818).

Orthocladiinae: *Brillia bifida* (Kieffer, 1909), *Cricotopus* (*Cricotopus*) *annulator* Goetghebuer, 1927, *Cricotopus* (*C.*) *bicinctus* (Meigen, 1818), *Eukiefferiella ilkleyensis* (Edwards, 1929), *Nanocladius* (*Nanocladius*) *rectinervis* (Kieffer, 1911), *Orthocladius* (*Orthocladius*) *oblidens* (Walker, 1856), *Tvetenia calvescens* (Edwards, 1929), *Tvetenia verralli* (Edwards, 1929).

Chironominae - Chironomini: *Paratendipes albimanus* (Meigen, 1818).

Chironominae – Tanytarsini: *Cladotanytarsus vanderwulpi* (Edwards, 1929), *Micropsectra apposita* (Walker, 1856), *Micropsectra atrofasciata* (Kieffer, 1911), *Micropsectra lindrothi* Goetghebuer, 1931, *Micropsectra pallidula* (Meigen, 1830), *Paratanytarsus inopertus* (Walker, 1856), *Stempellina bausei* (Kieffer, 1911), *Tanytarsus brundini* Lindeberg, 1963, *Tanytarsus ejuncidus* (Walker, 1856), *Tanytarsus heusdensis* Goetghebuer, 1923, *Tanytarsus lestagei* Goetghebuer, 1922, *Tanytarsus palettaris* Verneaux, 1969, *Tanytarsus pallidicornis* (Walker, 1856).

TIPPERARY, HA25: Lough Derg, Dromineer, IGR N046209

The sub-zone letter "N" was applied in error to the reference number instead of M in Murray *et al*. (2013, 2014, 2015). The reference "M046209" should read **N**046209. The following species are listed:

Tanypodinae: *Ablabesmyia* (*Ablabesmyia*) *monilis* (Linnaeus, 1758), *Procladius* (*Holotanypus*) Pe3 sensu Langton & Visser, 2003, *Procladius* (*Psilotanypus*) *rufovittatus* (van der Wulp, 1874).

Diamesinae: *Potthastia gaedii* (Meigen, 1838).

Orthocladiinae: *Orthocladius* (*Eudactylocladius*) *fuscimanus* (Kieffer, 1908), *Synorthocladius semivirens* (Kieffer, 1909).

Chironominae - Chironomini: *Cryptochironomus supplicans* (Meigen, 1830), *Glyptotendipes* (*Glyptotendipes*) *cauliginellus* (Kieffer, 1913), *Polypedilum* (*Polypedilum*) *nubeculosum* (Meigen, 1804).

Chironominae – Pseudochironomini: *Pseudochironomus prasinatus* (Staeger, 1839).

Chironominae - Tanytarsini: *Cladotanytarsus atridorsum Kieffer*, 1924.

TYRONE, HA1: Dennet Stream, Essbeg Bridge, Strabane, IGR H509978

This site, on the Dennet Stream (otherwise Burn Dennet) at Essbeg Bridge, was inadvertently assigned the incorrect IGR H384306 and incorrectly cited as being situated in the district of "Lisnaskee" (misspelling of Lisnaskea) in Murray *et al*. (2013, 2014, 2015). The amended description for this site is "Dennet Stream, Essbeg Bridge, Ballynamallaght, Strabane at IGR **H509978**. The IGR H384306 refers to a site on an unnamed stream near Lisnaskea, in HA36, County Fermanagh. The following species are on record at Essbeg Bridge:

Tanypodinae: *Conchapelopia* (*Conchapelopia*) *pallidula* (Meigen, 1818), *Trissopelopia longimana* (Staeger, 1839).

Diamesinae: *Diamesa tonsa* (Haliday, 1856), *Potthastia gaedii* (Meigen, 1838).

Orthocladiinae: *Cricotopus* (*Cricotopus*) *annulator* Goetghebuer, 1927, *Cricotopus* (*C.*) *bicinctus* (Meigen, 1818), *Cricotopus* (*C.*) *curtus* Hirvenoja, 1973, *Cricotopus* (*C.*) *similis* Goetghebuer, 1921, *Cricotopus* (*C.*) *tremulus* (Linnaeus, 1758), *Cricotopus* (*Paratrichocladius*) *rufiventris* (Meigen, 1830), *Cricotopus* (*P.*) *skirwithensis* (Edwards, 1929), *Eukiefferiella coerulescens* (Kieffer, 1926), *Orthocladius* (*Eudactylocladius) fuscimanus* (Kieffer, 1908), *Orthocladius* (*Orthocladius*) *rubicundus* (Meigen, 1818), *Rheocricotopus* (*Rheocricotopus*) *fuscipes* (Kieffer, 1909), *Tvetenia calvescens* (Edwards, 1929), *Tvetenia verralli* (Edwards, 1929).

Chironominae - Chironomini: *Polypedilum* (*Polypedilum*) *albicorne* (Meigen, 1838).

Chironominae - Tanytarsini: *Micropsectra lindrothi* Goetghebuer, 1931, *Micropsectra pallidula* (Meigen, 1830), *Rheotanytarsus pentapoda* (Kieffer, 1909).

WICKLOW, HA9: River Liffey, Ballysmuttan, IGR O057148

The six-figure IGR number cited as "O154148" in Murray *et al.* (2014) for collections by C. F. Humphries in 1929 from the River Liffey at Ballysmuttan (Humphries and Frost, 1937) is amended to O**0**57148**.** The following seven species are on record for this site:

Orthocladiinae: *Eukiefferiella claripennis* (Lundbeck, 1898), *Eukiefferiella ilkleyensis* (Edwards, 1929), *Orthocladius* (*Euorthocladius*) *rivulorum* Kieffer, 1909, *Orthocladius* (*E.*) *thienemanni* Kieffer, 1906, *Orthocladius* (*Orthocladius*) *rubicundus* (Meigen, 1818), *Rheocricotopus* (*Rheocricotopus*) *fuscipes* (Kieffer, 1909), *Synorthocladius semivirens* (Kieffer, 1909).

WICKLOW, HA10: Lough Tay, IGR O163080

The six-figure IGR number cited as "O163008" in Murray *et al.* (2013, 2014, 2015) is amended to O1630**80.** The following species are on record for this site:

Podonominae: *Parochlus kiefferi* (Garrett, 1925).

Tanypodinae: *Ablabesmyia* (*Ablabesmyia*) *longistyla* Fittkau, 1962, *Ablabesmyia* (*A.*) *monilis* (Linnaeus, 1758), *Procladius* (*Holotanypus*) *choreus* (Meigen, 1804).

Orthocladiinae: *Eukiefferiella dittmari* Lehmann, 1972, *Heterotanytarsus apicalis* (Kieffer, 1921), *Heterotrissocladius grimshawi* (Edwards, 1929), *Nanocladius* (*Nanocladius*) *balticus* (Palmén, 1959), *Nanocladius* (*N.*) *dichromus* (Kieffer, 1906), *Parakiefferiella bathophila* (Kieffer, 1912), *Synorthocladius semivirens* (Kieffer, 1909).

Chironominae - Chironomini: *Parachironomus* sp pe3 sensu Langton & Visser 2003, *Phaenopsectra flavipes* (Meigen, 1818), *Stictochironomus sticticus* (Fabricius, 1781).

Chironominae - Tanytarsini: *Neozavrelia cuneipennis* (Edwards 1929), *Stempellina bausei* (Kieffer, 1911).

WICKLOW, HA10: Greystones, intertidal rock pool, IGR O297127

The IGR six-figure grid reference cited as "O217127" in Murray *et al.* (2014) is amended to O2**9**7127. One species is on record here:

Orthocladiinae: *Clunio marinus* Haliday, 1855.

Acknowledgement

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FIRST RECORDS OF STRANDED NUTNEGS *MYRISTICA FRAGRANS* HOUTTUYN, 1774 (MAGNOLIALES: MYRISTICACEAE) ON THE IRISH COAST AND A REVIEW OF NORTH ATLANTIC RECORDS

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Abstract

Between July and October 2019, LMN discovered a total of 23 nutmegs *Myristica fragrans* Houttuyn, 1774 stranded at various locations along the shoreline of County Clare, on the Atlantic coast of western Ireland. The specimens represent the first records of stranded *M. fragrans* seeds from Irish waters. The occurrence and potential provenance of stranded nutmegs on Irish and North Atlantic maritime shores are reviewed. Flotation experiments suggest that some stranded nutmegs may represent true peregrine trans-Atlantic drifters while others may have been locally discarded.

Key words: Nutmeg, *Myristica fragrans*, stranded nutmegs, Irish waters and North Atlantic.

Introduction

The pantropical family Myristicaceae consists of c.21 genera and c.520 species of woody trees, shrubs and, occasionally lianas (Cristenhusz and Byng, 2016; Santamari-*Aguilar et al.*, 2019). *Myristica* is a genus of trees native to tropical Asia and the Western Pacific. Although at least 446 species and sub-species of *Myristica* have been described (Anon., 2020a), the identification of *Myristica* species based on traditional morphological criteria has always proven difficult, and so far, even DNA barcoding techniques based on *rbcL* and *mat*K genes have generally failed to satisfactorily differentiate between species (Tallei and Kolondam, 2015; Nanlohy *et al.*, 2017; Swetha *et al.*, 2019). However, recent studies using whole chloroplast genome sequences have proven more successful (Cai *et al.*, 2019; Mao *et al.*, 2019; de Oliveira *et al.*, 2020).

Meanwhile, the taxonomy of *Myristica* is still in a state of flux. Anon (2020b) listed a total of 175 accepted species, whereas Anon (2020a) considered that only nine of these were valid: *M. fragrans* Houtt. (Indonesia: Banda Islands, Malucu), *M. cagayanensis* Merr. (The Philippines), *M. glomerata* Miq. (Sri Lanka), *M. ingens* (Foreman) W.J.de Wilde (New Guinea), *M. philippensis* Lam. (The Philippines), *M. quercicarpa* (J.Sinclair) W.J.de Wilde (Indonesia,

Malaysia, Papua New Guinea and The Philippines), *M. rumphii* (Blume) Kosterm. (Indonesia: Lesser Sunda Islands and Maluku, and The Philippines), *M. simiarum* A.DC. (Taiwan and The Philippines), *and M. yunnanensis* Y.H.Li [China (S. Yunnan) to Thailand]. Using morphological criteria, Govind *et al*. (2020) recently described a new species of *Myristica* (*M. trobogarii*) from the southern Western Ghats in India.

Ecology and distribution of *Myristica fragrans*

Myristica fragrans is a dioecious evergreen tree, usually 5-15m tall, but occasionally reaching 30m, indigenous to the Moluccas (Spice Islands) of Indonesia. It grows wild on rich volcanic soils in lowland tropical rain forests. Its cultivation as a crop is largely confined to islands in the hot, humid tropics at altitudes up to 4,500m (Purseglove, 1968).

M. fragrans trees produce smooth yellow ovoid or pear-shaped fruits with a fleshy husk, 60-90mm in length and 35-50mm in diameter. When ripe the husk dehisces into two halves along a ridge running the length of the fruit. Inside is a single purple-brown shiny seed, 20-30mm in length and about 20mm in diameter, covered by a red or crimson aril. The seed is the source of nutmeg spice and the aril, the source of mace. Apart from its culinary uses, many other derivatives of *M. fragrans* have a wide range of ethno-medicinal, pharmacological, and cosmetic properties (Daniel, 1994; Thangaselvabai *et al*., 2011; Hetharie *et al.*, 2015; Nagja *et al*., 2016; Smith, 2018; Ibrahim *et al*., 2020).

Commercial cultivation of Nutmegs (*Myristica fragrans*)

Since the 1770s, *Myristica fragrans* has been widely introduced as a commercial crop into several tropical areas worldwide, including SE Asia (Australia, China, Taiwan, Thailand, Malaysia, Singapore, Papua New Guinea and The Philippines), Central Pacific (Cook Islands, Federated States of Micronesia, French Polynesia and Samoa), Indian Ocean (Bangladesh, Comoros, India, Madagascar, Mauritius, Mayotte, Reunion and Sri Lanka), Africa (Angola, Benin, Cote d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ghana, Nigeria and Tanzania,), South America (Brazil, Columbia, Guyana, Peru, Suriname and Venezuela), Central America (Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama), and many Caribbean Islands (Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Jamaica, Martinique, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, US Virgin Islands and, Trinidad and Tobago) (GBIF, 2019; Cadée and Kruiswijk, 2004; Zumbroick, 2005).

According to FAO statistics, a combined total of 109,283 tonnes of nutmeg, mace and cardamom (*Amonum* spp. and *Elettaria* spp.) were produced by 21 countries worldwide during 2018 (Anon., 2019). However, three of these countries accounted for over 83% of total

production: Guatemala (35%), Indonesia (33%), and India (15%). The combined production from the Caribbean region (Dominica, Guatemala, Grenada, Honduras, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago) accounted for 36.5%.

Nutmegs (*Myristica fragrans*) stranded on Irish and NW European maritime shores

Between July and October 2019, LMN discovered a total of 23 nutmegs stranded at various locations along the shoreline of County Clare, on the Atlantic coast of western Ireland (Plates 1-2). The specimens represent the first records of stranded *Myristica fragrans* seeds from Irish waters. Details on all known stranding records from NW European maritime shores are summarized in Table 1.

There are only ten previous reports of stranded nutmegs on NW European maritime shores, including three from Scotland (Outer Hebrides), six from England (Cornwall), and one from the Netherlands (Zandvoort). The earliest known records, three dating from 1900-1919, were discovered on the Isle of Barra, in the Outer Hebrides, off the west coast of Scotland. Almost a century later, single specimens were reported from the Dutch coast and Cornwall during 2004 and 2008 respectively. It is interesting to note that five of the Cornish specimens were recorded during 2013 (Plate 3) which suggests that there may have been a relatively large influx of nutmegs in southwest England during that year, and an even larger influx on the western Irish coast during 2019. The maximum length and width of the NW European nutmegs ranged from 20-30mm and 19-25mm respectively. The vast majority of the nutmegs stranded on NW European shores were recorded between July and December.

Nutmegs (*Myristica fragrans*) stranded on western North Atlantic maritime shores

Stranded nutmegs have been found over a wide maritime area in the western North Atlantic, ranging from Mexico (Yucatan Peninsula), Texas (Padre and Mustang Islands), and Florida, as far north as North Carolina (Cape Hatteras) (Gunn and Dennis, 1973; Gunn *et al*., 1976-1982; Perry, 2000; Sullivan, 2003; Norton, 2008; Perry and Dennis, 2010). Although these stranded nutmegs were generally considered to be *Myristica fragrans*, it was acknowledged that nuts belonging to other genera of Myristicaceae may also occur on western North Atlantic shores (Gunn *et al*., 1999; Sullivan *et al*., 2008; Perry and Dennis, 2010; Witherington and Witherington, 2017). For example, Ucuhuba [*Virola surinamensis* (Rol. *ex* Rottb.) Warb. (*Myristica surinanensis* Rol. *ex* Rottb.)], a heavily buttressed tree up to 35m tall, which is common in swamp and marsh forests along rivers and creeks from the Guianas (northern coast of South America) to Costa Rica on the Caribbean coast of Central America (van Roosmalen, 1985), produces seeds which are morphologically similar to *M. myristica* (Smith and Wodehouse, 1937; Gurgel *et al*., 2006; Santamaría-Aguilar *et al*., 2019). Beerensson (2009)

also noted that stranded Lantern Tree (*Hernandia sonora* L.) seeds are often confused with small nutmegs.

Discussion

Nutmegs are primarily dispersed by animals, particularly by birds (Hemsley, 1885; Guppy, 1906; Ridley, 1930; Howe and Vande Kerckhove, 1980; Howe and Miriti, 2004; Moreira *et al.*, 2017; Freitas *et al.*, 2018), but some may also be dispersed by water (hydrochory), at least secondarily. Ridley (1930) speculated that some fallen nutmeg seeds may be dispersed by forest streams, but are unlikely to survive long immersion in seawater. Guppy (1906) observed unopened nutmeg fruits floating in seawater off the Solomon Islands, but after dehiscing, the ripe seeds sank. He also noted that the seeds of two nutmeg species in Fiji only floated for 3-7 days. Cadée and Kruiswijk (2004) noted that the single stranded nutmeg recorded from Zandvoort (Western Netherlands) only remained afloat in seawater for nine days.

It has been suggested that nutmegs stranded on NW European shores are most likely derived from shipwrecks, lost cargo, or locally discarded (Nelson, 2000; Cadée and Kruiswijk, 2004). Indeed, one nutmeg was discovered on a ship wrecked around 1658 off the Dutch coast (Cadée and Kruiswijk, 2004). The authors speculated that nutmegs from shipwrecks might be transported along the sea bottom towards the coast by waves and currents in the same way that most shells, which also cannot float, are transported on to maritime beaches. However, long term immersion in water (either fresh or seawater), particularly in potentially anoxic benthic environments, is likely to lead to gradual bacterial decay of the endosperm and the release of gases which might result in some level of temporary buoyancy; empty nutmegs may have greater flotation properties than whole nutmegs.

Whole retailed nutmegs have been reported to sink immediately like stones (Nelson, 2000; Cadée and Kruiswijk, 2004), and similar results were observed by DQ with both whole and broken nutmegs of Indonesian origin purchased from two Irish retail outlets. It is interesting to note that commercially harvested nutmegs are routinely sorted on the basis of their flotation properties; 'sinkers' are marketed while 'floaters' are discarded (Daniel, 1994). Perhaps some of these 'floating discards' find their way into the sea and are dispersed by oceanic currents?

After having been stored dry for almost 12 months up to 75% of the stranded County Clare nutmegs immediately sank when placed in either fresh or saltwater, and the remainder sank over the following three days, which strongly suggests that they were of retail origin and most likely locally discarded. Indeed, it was clear that the endosperm was fully intact in one of the stranded nutmegs (Plate 2).

Nevertheless, Nelson (2000) noted that seawater flotation tests on nutmegs stranded in the western North Atlantic indicated that at least some can float for up to 4.5 years, which prompted

Gainey (2014) to suggest the possibility that some nutmegs might be capable of drifting across the Atlantic *via* the Gulf Stream and North Atlantic Drift to NW European shores, within the estimated minimum time interval of 14 to 18 months (Quigley *et al*., 2016). Perhaps these long term 'floaters' were derived from commercially discarded nutmegs in the Caribbean region? Indeed, it is interesting to note that after seven years in dry storage, each of the five nutmegs found stranded in Cornwall during 2013 remained afloat during recent, albeit short-term seawater flotation tests. PAG noted that the Cornish nutmegs were partially empty (endosperm remains 'rattled' inside), and the surface was significantly worn compared with those from County Clare.

Considering the observed long-term flotation properties of nutmegs stranded in the western North Atlantic (4.5 years), it is conceivable that some of the nutmegs stranded on NW European shores, particularly those found in Cornwall during 2013, may represent true peregrine trans-Atlantic drifters, possibly commercial discards ('floaters') from the Caribbean region which currently accounts for 36.5% of global production.

Although it is possible that genetic analyses may reveal the provenance of stranded nutmegs, they are unlikely to explain the mechanisms as to how they arrived on maritime shorelines, perhaps several thousand miles from where they were originally harvested. Considering the widespread cultivation and international trade in *Myristica fragrans*, it is possible that stranded nutmegs could be derived from several different tropical regions in either the Old or New World. If genetic techniques revealed that the County Clare nutmegs were of Caribbean origin, it might lend some support to the peregrine hypothesis, but considering their poor flotation properties, they were most likely locally discarded.

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TABLE 1. NW European records of stranded Nutmegs (*Myristica fragrans*).

Table 1. NW European records of stranded Nutmegs (*Myristica fragrans*)

Date	Location	Latitude (°N)	Longitude	Number	Max. Length (mm)	Max. Width (mm)	Max. Depth (mm)	Collector	Voucher Specimens	Reference
c.1800	Isle of Barra, Outer Hebrides, W Scotland	56.9869	7.4566 °W	2				William MacGillivray	ABDUZ: 50096.36 & 37	Nelson (1988, 2009), Perry & Dennis (2003)
1908-1919	Isle of Barra, Outer Hebrides, W Scotland	56.9869	7.4568 °W	1	20			William MacGillivray	WHM: 1992.13.76.8	Nelson (1988, 2009), Perry & Dennis (2003)
24/09/2004	Zandvoort, W Netherlands	52.3748	4.4227 °E	1	20			Wim Kruiswijk	Wim Kruiswijk's private collection	Cadée & Kruiswijk (2004)
15/12/2008	Porthchothan Beach, N Cornwall, SW England (SW86872)	50.5103	5.0276 °W	1	23.5	19	18	Jane Darke	Jane Darke's private collection	Gainey (2014)
25/07/2013	Perhale Beach, N Cornwall, SW England (SW762567)	50.3728	5.1353 °W	1	29	25	23	Chris Easton	Chris Easton's private collection	Gainey (2014)
15/11/2013	Perranporth Beach, N Cornwall, SW England (SW7554)	50.3490	5.1565 °W	1	28	24	33	Chris Easton	Chris Easton's private collection	This paper
15/11/2013	Perranporth Beach, N Cornwall, SW England (SW7554)	50.3490	5.1565 °W	1	30	21	20	Chris Easton	Chris Easton's private collection	This paper
22/11/2013	Gwithian Beach, N Cornwall, UK (SW575407)	50.2214	5.3865 °W	1	28	24	21	Paul Gainey	Paul Gainey's private collection	This paper
26/12/2013	Perranporth Beach, N Cornwall, SW England (SW76537.	50.3490	5.1565 °W	1	25	21		Jane Darke	Jane Darke's private collection	This paper
15/7-14/10/2019	between Seafield Beach (Quilty) and Fanore Beach, Co Clare, W Ireland	52.8173-53.1197	9.2882-9.4555 °W	23	22-28	19-22		Liam MacNamara	DBN: 2020.[4] & Liam MacNamara's private collection	This paper

PLATE 1. Nutmegs (*Myristica fragrans*) stranded on the County Clare coast, Ireland (July - October 2019). Photograph © Liam MacNamara.

PLATE 2. Nutmegs (*Myristica fragrans*) stranded on the County Clare coast, Ireland (July - October 2019). Photograph © Liam MacNamara.

PLATE 3. Nutmegs (*Myristica fragrans*) stranded on the coast of Cornwall, England (July - December 2013). Photograph © Paul A. Gainey.

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NOTES ON 'IRISH' SPIDERS (ARACHNIDA): *ATYPUS AFFINIS* EICHWALD (ATYPIDAE) AND *ENTELECARA ERRATA* O. P.-CAMBRIDGE (LINYPHIIDAE) REMOVED FROM THE IRISH LIST; *CRYPTACHAEA BLATTEA* (URQUHART) (THERIDIIDAE) NEW TO IRELAND

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Abstract

Evidence for the presence in Ireland of the tarantula *Atypus affinis* Eichwald, 1830 rests upon a single web found in County Offaly in 1896. Novel information suggests that the web was very likely imported by a plant-nursery business implying that the species was never established here. In the absence of evidence of establishment, the spider should be removed from the Irish checklist. Re-examination of the only Irish male specimen of the minute linyphiid spider *Entelecara errata* O. P.-Cambridge, 1913 shows it was mis-identified and the only other specimen, a female, cannot be located. Females of this genus have proven difficult to separate and there is also a lack of congruence between the species' preferred habitat and that in which the Irish specimens were found. Given this, it is felt appropriate to remove this species also from the Irish list. The first Irish records of the theridiid spider *Cryptachaea blattea* (Urquhart, 1886) are noted on the basis of specimens found in and around buildings at two locations in Dublin in 2019 and 2020. Most of the records from both Britain and continental Europe are from the last 12 years and it is spreading through both landmasses in synanthropic situations. It is established in at least one location in County Dublin.

Key words: Arachnida, Atypidae, Linyphiidae, Theridiidae, *Atypus affinis* Eichwald, 1830, *Entelecara errata* O. P.-Cambridge, 1913, *Cryptachaea blattea* (Urquhart, 1886), Irish list, deletions, addition.

Introduction

However enjoyable it might be to add clarity to an understanding of the Irish spider fauna it is unfortunate to have to remove a species as interesting and unusual as *Atypus affinis* Eichwald, 1830, the purse-web spider. Its glossy, black colouration, massive jaws and fangs, unusual predatory habits, and the fact that it is probably the only 'tarantula' that might occur naturally in Ireland make it a fascinating spider. However, the evidence adduced here explains why the spider has not been seen since 1896 and provides reasonable grounds for excluding it. This is preferable to exclusion solely on the grounds of the elapse of a significant, if arbitrarily chosen,

period of time. Its Irish status should probably have been questioned more substantially long ago.

The matter of *Entelecara errata* O. P.-Cambridge, 1913 underlines the importance of the existence of voucher specimens. Were it not for the deposition in the Manchester Museum of some Irish material collected by David Mackie, the species would potentially hover uncertainly on an Irish checklist for decades to come. Attempting to find a small, cryptic species in its favoured habitat can be difficult at the best of times, but is far more difficult if it is not there in the first place.

It is obviously of interest to be able to note the earliest possible occurrence of novice species. First Irish records of a number of spiders published over the last 16 years have included a high number from the family Theridiidae and *Cryptachaea blattea* (Urquhart, 1886) is yet another: it is noted here for the first time from Ireland where it is breeding in at least one area of County Dublin.

Atypus affinis Eichwald, 1830 (Atypidae: Mygalomorphae) removed from the Irish checklist

The presence of *Atypus affinis* Eichwald, 1830 in Ireland was first noted on the basis of "the discovery of the tubular nest of a female *Atypus* by Rev. Canon Russell of Geashill, near Tullamore." (Carpenter, 1896). No spider was found with the nest but it did contain a caterpillar of the ghost moth *Hepialus humuli* (Linnaeus, 1758), a species known to occur in Ireland at that time. The progeny of the nest was authenticated by the eminent British arachnologist, the Reverend Octavius Pickard-Cambridge, to whom Carpenter sent it for examination. While the absence of a spider meant a doubt could be expressed about the species involved, the nest itself was at very least evidence of the presence in Ireland of a species of *Atypus* Latreille, 1804. A subsequent note added that "the *Atypus* tube from King's Co…was found by Mrs. Reamsbotham (sic.)." (Anon, 1896), confirming the nest was found in County Offaly (then King's County) and a later summary provided a more authoritative summary noting "The presence of this spider in Ireland was made known by the discovery of its tubular nest at Geashill, King's County, by Mrs. Reamsbotham (sic.) in May 1896." (Carpenter, 1898). Carpenter nominated the species as *Atypus piceus* (Sulzer, 1776) on the basis of this being the commoner species known from Britain, however, it was later clarified that the only *Atypus* species occurring in Britain is *Atypus affinis* Eichwald 1830 and this name appeared against the Irish record in later publications (Bristowe, 1939; Locket *et al.*, 1974; McFerran and Ross, 1993; Helsdingen, 1996) in spite of a specimen never having been found.

The web in question is still held in the collection of the Natural History Museum, Dublin (NH:2008.104.32) and a re-examination and comparison with a British sample kindly supplied

by Richard Burkmar (collected from Caswell Bay, Swansea, U.K., 29 September 2018) showed that it was clearly of *Atypus* type. In a functioning nest much of the spider's web is completely concealed underground, however the long emergent section, the sock, may be set prostrate on the ground, elevated amongst vegetation or set nearly vertical against a tree root or stone. The Geashill web consists only of the exposed section and is 10mm wide and 75mm long.

The possibility that *Atypus* might be established in Geashill seemed to be enhanced by the fact that substantial areas of esker run through and beyond the village and it was felt these relatively light, insolated soils might be favourable to the spider given that such conditions are preferred by all of the European species (Řezáč *et al.,* 2007). A hand-search of the Castle Hills and the quarry in Geashill was carried out by the author on 12 October 2007 and the Castle Hills were examined again on 29 May 2019 as part of a Bioblitz. Twenty-five areas of calcareous grassland, often with similarly insolated soils, were surveyed using pitfall traps in 2006 and hand collections were carried out at six of these sites in July of the same year (Nolan and Regan, 2008) and no evidence was seen of the species' presence. Burkmar (2019) provides a useful synopsis of the species' biology and preferred environment in Britain showing that the spider occurs there in soil and habitat types that are found in Ireland, so it is not unreasonable to consider that the spider might occur here.

Nevertheless, in spite of a significant renaissance in spider related research in Ireland over the last 20-30 years, and much collecting, no evidence that *Atypus* is resident in Ireland has been found. It seems unlikely that the relatively large web would be repeatedly overlooked by the arachnologists, entomologists and botanists alike who are frequently searching for specimens possibly orders of magnitude smaller than the exposed 'sock'. It needs to be explained also how adult males, who leave their nests to search for a female-occupied web especially from September to November, would be repeatedly missed by either a practised or casual observer.

The lapse in time since the original find is justification alone for excluding the species from an Irish checklist. However, it can be proposed that *Atypus* is not and has never been resident in Ireland on basis of the novel information that Mrs Reamsbottom (entries in the *Irish Naturalist* spell the name wrongly) and her husband were in 1896 running a plant nursery from their residence at Alderborough, Geashill, a fact of which I was made aware during a short trip to the village in 2019 to participate in a Bioblitz. I would suggest the web involved was extracted from plant-nursery products e.g. a root-ball of soil and that it was not found in the wild. Biographical information can be adduced to verify the identity of Mrs Reamsbottom and Canon Russell and to show there is little likelihood that other individuals might be involved.

The 1901 Census shows that the only Mrs Reamsbottom in Geashill at that time was Mary Reamsbottom who is noted as a married gentlewoman aged 38 and living in the townland of Alderborough with her husband William and children. He is described as a "nurseryman",

originally from Tipperary, and amongst the other residents at their address were a number of workers - a manager, a foreman, a packer, an apprentice and three pupils - signifying the scale of the business. Going back in time we meet William Reamsbottom, travelling in Britain in 1881, who is noted in the U.K. census of that year as an unmarried boarder aged 21, a "Nursery Man and Bulb Importer" originally from Nenagh (the original of the enumerator's form seems to read Menagh which I suspect is an error), County Tipperary, Ireland. His name appears in an advertisement of bulbs etc. for sale in *The Gardener's Chronicle* of January 21st 1882 when his business was based at the Deanery in County Armagh. In 1890, according to their marriage certificate, while resident at Twickenham House in Ballycumber, County Offaly he married Mary *née* Mary Maude Enraght Moony from The Doon, Athlone at Liss Church, near Ballycumber. In a letter advertising his business in the *Pall Mall Gazette* (3 September 1896), William states that his nursery business was established by 1891 in Alderborough House (less than a mile from Geashill centre) and that in 1896, he had over 30,000 customers on his books. He is listed as a commercial florist located there in 1894 (Slater, 1894) and Mary's name appears in the account of rents paid to the Digby estate for the year ending March 25th 1894 (Digby, 1895). In 1907, they exhibited at the Irish International Exhibition, part of the World Fair joint-hosted by Britain and Ireland in that year. A publication associated with the same Exhibition observes of the Geashill Farm "Six statute acres…densely covered with every hue and shade." (Anon., 1907). A 1907 trade catalogue alphabetises in over 50 pages the various plants available for purchase (Reamsbottom and Kenyon, 1907). It is inevitable that even by 1896 the scale of their business meant small invertebrates would be occasionally imported or exported.

Canon Russell, to whom Mary brought the web, we learn from the 1901 Census was Charles Dickinson Russell (aged c. 61 in 1896), then resident at 2 Glebe East in Geashill (Plate 1), Russell was a Clerk in Holy Orders and an amateur naturalist; he died in Geashill and is buried in a family plot in the grounds of St Mary's Churchyard in the village (Offaly Heritage Services, 2020). He collected liverworts with David McArdle of The Botanic Gardens on field trips in 1890 and 1891 to Counties Offaly and Laois (McArdle, 1892); collected mosses on a bog near Geashill (Lett, 1893) and, published an observation of Common Toothwort *Lathraea squamaria,* also from Geashill (Russell, 1896). He was involved with the Dublin Microscopical Club, sending a fungus for exhibit (Anon., 1893) and himself exhibiting the wing of a chalcid fly and sections of a leaf (Anon., 1897, 1899). Given that Russell and the Reamsbottoms were undoubtedly acquainted, Russell would have been an obvious first port of call for Mary with her curious find.

Given the situations in which *A. affinis* occurs in England and Wales, there is little reason why it would not survive in Ireland should it make it here. It can live even on relatively

managed grasslands, with notable recent records from urban grasslands near Hastings, England (Price and Burkmar, 2016) and at the base of an ornamental garden pot in Jersey (Grant, 2019). Examinations that I have made of plausible habitats in the hope of finding the spider, I now suspect were made in vain.

Given the only evidence of the spider's Irish status, the Geashill web, and the strong likelihood that a functioning plant nursery operating on a large-scale will import invertebrates, I think sufficient doubt can be raised about an Irish provenance for the web as to exclude *Atypus* from future checklists of Irish spiders. Where the web might have come from remains in question.

***Entelecara errata* O. P.-Cambridge, 1913 removed from the Irish checklist**

The published record suggests that *Entelecara errata* O. P.-Cambridge, 1913 has been twice collected in Ireland. The first record, a female, was collected by David Mackie and Frank Millidge from the Burren in May/June 1969 (Mackie and Millidge, 1970). Mackie subsequently collected and noted a male specimen of *Entelecara media* Kulczyński 1887 from Barley Cove in County Cork, probably from Marram dune (Mackie, 1972). The two species were for a period of time considered synonymous by British authorities (see below), hence that of *E. media* would be now considered to represent *E. errata,* unless *E. media sensu stricto* were shown to occur in Ireland.

It is necessary to clarify the status of the name *E. media* which appeared in Mackie (1972) since it has travelled somewhat in the Irish literature. The taxon made its first appearance as a British spider only *w*hen *E. errata* was identified as a synonym thereof (Lockett and Millidge, 1963), which meant that specimens of *E. media* should be identified using the illustrations of *E. errata* in Locket and Millidge (1953). It was not until some years later that examination of type material led to the deletion of *E. media* from the British checklist (Locket *et al*., 1974) and the recognition of *E. errata* as the valid British species. The Irish record of *E. media* was then attributed to *E. errata* and was mapped under this name in Lockett *et al*. (1974), as was the earlier County Clare record of *E. errata*.

One might question why *E. errata* was noted by Mackie and Millidge in 1970 when *E. media* was understood to be the correct name for that species at the time? It might be suggested that the authors by then understood the necessity of reviving *E. errata*, however that would surely have meant that *E. media* would have been avoided in the 1972 note? Before making things knottier than they need be, I think we can accept that as a co-author of the 1974 publication which revived *E. errata* and which mapped the Irish *E. media* specimen under that name, Millidge no longer regarded the specimen of *E. media* as representing anything other than *E. errata*.

E. errata subsequently appeared as Irish in an "imperfect" checklist (McFerran and Ross, 1993) which sought to update that of Carpenter (1898). The taxon *E. media* was not included in this list, presumably on the advice of the British experts consulted, the authors not indicating a source for the taxonomy that they follow. *E. media* was revived, however, as an Irish species when van Helsdingen (1995, 1996) seems not to have noticed that the taxon had been transferred to *E. errata* in Locket *et al*. (1974). He thus listed both *E. errata* and *E. media* in his 1996 compilation of Irish county records (Helsdingen, 1996) treating the record of the latter species as *E. media sensu stricto*. He had previously raised a question-mark against this species' Irish status (Helsdingen, 1995) but did not suggest the name may have been an error of synonymy in either publication. Both McFerran and Ross (1993) and Helsdingen (1996) acknowledged that their lists were not based on a critical review of specimens.

On foot of the reappearance of the name in van Helsdingen (1996), Cawley (2004) deleted *E. media* from the Irish list, accepting the opinion expressed in Lockett *et al.* (1974) that it represented a record of *E. errata*. Cawley had earlier inquired of Dmitri Logunov at the Manchester Museum about the Mackie specimen of *E. media* but was told there was no specimen of that name in the Mackie collection. I sent an inquiry to Dmitri Logunov in late 2005 regarding a number of Mackie records and was able to borrow some Irish material and vouchers of other species. These included a specimen of *E. errata* and the label carried the following details "Entelecara errata Barleycove, Co. Cork, 21-6-1971 ♂ (at sea level) (Det. By A. F. Millidge)" "G. 6181" (while the label would seem to indicate that Millidge had identified the specimen as *E. errata* it is possible that it was simply relabelled on basis of the synonymy of that species with *E. media*). Given the coincidence of collection data, and the synonymy of *E. errata* and *E. media* in Britain, it is accepted here that the Manchester Museum specimen of *E. errata* from Ireland is in fact that listed as *E. media* by Mackie (1972). Re-examination of this specimen however showed it to be clearly referable to *Entelecara erythropus* (Westring, 1851), the commonest *Entelecara* species in Britain and Ireland. Cawley's search was thus possibly unsuccessful because the specimen had been re-labelled as *E. errata*. A negative response to inquiries by myself and Cawley about the female from the Burren suggest it was not deposited in the Manchester Museum.

Logunov very kindly loaned also specimens of *E. errata* sensu stricto collected in Scotland, "Entelecara errata O.P.C. ♀♀♂♂ Cairnwell, Perth No135773 3059 3650 19-6-66 coll. det. J. Crocker" and "Entelecara errata Cairnwell, Perths. 1-8-70. 2♀-♂ over 3000' (Det. A.F.Millidge)". The 1966 records were published (Cooke, 1967). It was possible thus to compare the Irish male specimen of "*E. errata*" with a number of British males leaving no doubt whatsoever that it had been misidentified in Mackie (1972). It was also possible to examine a large number of females and compare these with Irish specimens. In my experience,

epigynal features of teneral specimens of *E. erythropus* could sometimes very closely resemble those of *E. errata* (Roberts, 1993) but examination of the British specimens cleared my mind of any doubt that I might have misidentified Irish specimens of *E. errata* as *E. erythropus*.

Thus, examination of the male specimen of *E. errata* collected in Ireland in 1971 shows it to be a mis-identification. The voucher of the female specimen recorded in 1969 possibly no longer exists and females of this species can be difficult to distinguish from some of their congeners. These factors in conjunction with the taxonomic uncertainties noted around the time the Irish specimens were collected and the small likelihood that this rare, strongly northern and strictly montane species (Nentwig *et al*., 2020) would be found at sea-level in Ireland, together suggest that *E. errata* should be excluded from future Irish checklists.

***Cryptachaea blattea* (Urquhart, 1886) new to Ireland**

Records

DUBLIN: Solomon Gallery, Balfe Street, Dublin City (O158337), 4 September 2019, 1♂ crawling up a wall about 80cm from the ground. Leinster Square, Rathmines, Dublin City (O155317), 25 April 2020, 1♀, 1 submature ♀ collected from webs c. 60-100cm from the ground set into the corners of abutting garden walls; 21 July 2020, 1♀ collected from a web set within a recess on a hose-pipe reel; 12 September 2020 1♀ with an egg-sac in a lightly disguised web in a corner of abutting garden walls 90cm off ground (Plate 2); 1♂ with two egg-sacs (no female was present) from another similarly disguised web 40cm above, under a shallow eave; 1♀ and egg-sac from a similarly positioned web 2 metres away; 1♀ with a retreat set under a door hinge, 25cm from the ground.

The first specimen collected was spotted crawling on the gallery wall above a number of stacked paintings, part of a consignment of artworks that had just been delivered from London, U.K. It had the appearance of a male theridiid spider and while a number of species from the family Theridiidae regularly occur on and within buildings/built structures in Ireland e.g. *Theridion melanurum* Hahn, 1831, I felt it did not quite resemble any of these so collected it. Later, a closer look with a hand lens revealed an adult male and substantiated my suspicions that it was something 'different'; a microscope examination on the 8 September revealed a strongly protuberant and rounded tip to the cymbium of the palp which alone differentiated it from all other Theridiidae known from Ireland to date (Roberts, 1993; and see below). Aware that a number of Theridiidae species had been described over the last decade as new to Britain, possible candidates were examined and I was eventually able to identify the specimen as *Cryptachaea blattea* (Urquhart, 1881) using Wunderlich (1992) and Vink *et al.* (2009). Peter Harvey kindly confirmed the identification of the male, as did Barbara Knoflach-Thaler from a photograph.

The artworks had been gathered from various locations around Britain**,** brought to a Gallery in central London and then taken to another location in London W3 in August for wrapping and packing (almost everything when wrapped went into a single very large, open-topped, card box). They were collected on 27 August and delivered to Dublin on 4 September 2019. Thus, the spider might have hitched a ride from any one of a relatively large number of locations and given that it appears to be spreading around Britain with some speed (see below), it did not seem productive to attempt to trace the origin of all the artworks. I did not find any other specimens in the gallery over the subsequent few months and commenced composing a note assuming it was an introduction whose presence suggested the spider had potential to establish itself in Ireland had it not done so already.

In April of 2020, I noticed a number of small webs built into the corners of abutting garden walls in Rathmines, the webs' presence revealed by elements of trapped detritus such as leaf fragments (see Plate 2). Mindful by then of *C. blattea*'s habit of decorating its web with such materials, I investigated and an examination with a hand-lens of the abdomen of the first specimen collected revealed a small protuberance on the rear of the abdomen, white on its posterior face, a character strongly diagnostic of *C. blattea*. I spotted and collected another specimen shortly afterwards and a microscope examination later that day confirmed that both specimens were female, the first collected being sub-mature and the second mature.

Over the following months, despite COVID-19 lockdown restrictions, it was possible while walking to casually inspect webs built into corners on the front of garden walls and pillars at a wide number of locations in the vicinity of Rathmines (and further afield as lockdown restrictions eased), however no other specimens were collected.

In later July, a number of walls (amongst other elements) were examined at Leinster Square for webs and their occupants and another adult female was found in the same area as the sub-mature female found in April. Further specimens were found in the same locations in early September including another adult male and egg-sacs in three different webs indicating that the species is breeding. The fact that the population is breeding and that males are present in September suggests the possibility that I may have transported the male specimen into the Gallery but transport from London cannot be discounted.

The first British record was from a garden on the Isle of Wight in 2011 (Marriott, 2012) and it is now known from over 25 hectads, the furthest north being Lanarkshire, Scotland (SRS, 2020). The earliest European record was from Albania in 1994 (Deltshev *et al*., 2011). All other continental records are very recent and it has spread widely over the last 12 years: Germany 2008 (Sührig, 2010), Britain 2011 (Marriott, 2012), Switzerland 2013-2014 (Hänggi and Straub, 2016), France 2014 (Le Divelec *et al*., 2018) and the Netherlands 2014 (Bink, 2014). It was also recorded from the island of Porto Santo, Madeira in 2008 (Crespo *et al*., 2009).

Marriott (2012) suspected that the first British specimen may have found its way to the garden *via* the Chelsea Flower Show because the garden's owner was a long-time participant. Other first European country records were from such situations: a shrub and tree nursery in Germany (Sührig, 2010); plant nursery greenhouses in Switzerland (Hänggi and Straub, 2016); the Jardin des Plantes (Botanic Gardens) in Paris (Le Divelec *et al*., 2018); a garden centre in the Netherlands (Bink, 2014). A number of the British records are also from gardens: the Wildlife Garden of the British Museum of Natural History, London (Thomas, 2015); a garden in Gloucester (Killick, 2016); a number of gardens in Cornwall and the South Wales coast (Berry, 2019) and most recently in north Wales (Gallon, 2019, 2020). The only known Irish breeding location is thus very much in keeping with these records.

The spider regularly makes use of anthropogenic artefacts e.g. garden furniture, plants pots etc. to set its webs. It establishes a small retreat, often suspended aerially, composed of silk to which the spider attaches debris, against or amongst which the spider can be almost invisible (Berry, 2019). Berry (*op. cit.*) noted between one and four egg-sacs in a retreat from April to July and these were usually covered with debris and incorporated into structure of the retreat. It is of interest then that I saw no egg-sacs earlier in the summer and that the species breeding season would seem to be quite long.

This is the second species from the genus *Cryptachaea* Archer, 1946 to occur in Ireland. *Cryptachaea riparia* (Blackwall, 1834) (previously in *Achaearanea*) is known from only a handful of Irish sites (Nolan, 2016) and is found predominantly amongst embedded boulders on the strongly sloping sides of eskers and other glacial deposits. *C. blattea* was first described from New Zealand but is considered to have a Palearctic origin. It has been spreading globally for more than a century, probably from the Macaronesian archipelago or the Azores and apart from Europe, it is also now established in China, Chile, Hawaii and the west coast of North America (Vink *et al*., 2009). The species' appearance in Ireland would seem to be part of a general trend of rapid expansion through a broad band of central and southern Europe.

Discussion

A number of spiders from the Theridiidae have been recorded from Ireland for the first time, or had doubts about their Irish status resolved, over the last sixteen years, amongst them the now well-known large or noble false-widow *Steatoda nobilis* (Thorell, 1875) (Nolan, 2000). That species is largely confined to built environments but well able to survive outdoors in such situations. Two species were fairly recently confirmed for Ireland: *Simitidion simile* (C. L. Koch, 1836) and *Platnickina tincta* (Walckenaer, 1802) (Cawley, 2004). The first seems to be confined to heathlands and bogs with *Calluna* while the latter has since been found in a number of broadly anthropogenic situations (Cawley, 2008; Nolan, 2016). While *Crustulina guttata*

(Wider, 1834) is confined to natural sea-cliff habitat (Nolan, 2014), a number of other Theridiidae recently recorded here for the first time are also largely associated with built environments: Cawley obtained the first records of *Enoplognatha latimana* Hippa & Oksala, 1982 (Cawley, 2004) and these and subsequent records were usually from anthropogenic situations (Cawley, 2008; Nolan, 2016). The first Irish records of both *Episinus maculipes* Cavanna, 1876 (Nolan, 2012) and *Theridion hemerobius* Simon, 1914 (Nolan, 2013) were similarly found on buildings or built structures albeit in the case of the latter on the edges of rivers and canals. In a paper assessing alien (non-European) spiders recorded in Europe, Nentwig (2015) found that the largest number was from the Theridiidae, indicating perhaps both an ability for dispersion in this family and also a proneness to human-assisted transport. This general rule would seem to be reflected in changes in the Irish fauna also.

A checklist of spiders of Britain and Ireland published in 2019 (Lavery, 2019) listed 419 species as established in Ireland. The present note deletes two names from that list and adds one more. As such the current Irish spider fauna stands at 418 species.

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PLATE 1. Photograph of C. D. Russell and others with the original caption. The photograph appeared in John Kearney's *Killeigh and Geashill, a pictorial record* and is reprinted here with his kind permission.

PLATE 2. The retreat of *Cryptachaea blattea* 'disguised' with fragments of *Cupressus leylandii*, Rathmines, Dublin City, 12 September 2020. A single greyish egg-sac can be seen sandwiched between two fragments of vegetation on the left (behind which the spider is hidden) and the desiccated remnants of a woodlouse are suspended in the bottom of the web. Photograph © Myles Nolan.

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RELATIVE ABUNDANCE OF ROVE-BEETLES (COLEOPTERA: STAPHYLINIDAE) FROM GRASSLANDS AND PASTURES IN IRELAND AND GALICIA, SPAIN

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Abstract

Relative abundance data from suction sampler and pitfall trap samples of 159 species of Staphylinidae (Coleoptera) are reported from 23 sites, including improved pastures, semi-natural grasslands (turloughs, limestone and *Sesleria* grassland, fixed sand dunes, old meadow) and restored grasslands (mine tailings and spoil, road cuttings) from Ireland and Galicia (Spain). Apparent habitat preferences of some characteristic species are discussed. A number of rarely-recorded species are also reported, as are further data on the habitat differences between *Atheta* (*Mocyta*) *amplicollis* and *A. fungi*.

Key words: Staphylinidae, mine tailings restoration, *Sesleria* grassland, Lydacan turlough grassland fauna, *Atheta amplicollis, Atheta fungi* Ireland, Galicia, Spain.

Introduction

Grassland covers over 55% of the land area of Ireland (Lydon and Smith, 2014), the largest percentage cover of any country in the European Union (Eurostat, 2019), even when compared to Atlantic parts of larger countries, such as Galicia (Spain) where grassland amounts to approximately 12.5% of land cover (Paz-Ferreiro, *et al*., 2010). Our knowledge of the structure of the staphylinid fauna of Irish grasslands and pastures, both improved and semi-natural, has been steadily increasing in the last four decades (e.g. Curry and O'Neill, 1979; Anderson, 1984, 1997; Good and Giller, 1990; Good and Wistow, 1997; Nash, Anderson and O'Connor, 1997; Good and Butler, 1996, 2001; Good, 1999a, b, c, 2004; Regan and Anderson, 2004; Helden *et al*., 2008, 2010, 2015; Lott and Anderson, 2011), as it has in other parts of Atlantic Europe (e.g. Welch, 1979; Desender *et al*., 1984; Bauer, 1989; Dennis *et al*., 1997, 2004). However, our knowledge of the habitat associations of grassland and pasture staphylinids remains poor. Previously unpublished relative abundance data are reported here from both Ireland and Galicia.

Methods

Details of sites sampled and sampling techniques are given in Table 1. 'D-vac' refers to the Dietrick vacuum insect suction sampler (Dietrick, 1961); 'S-vac' to a Stihl® BR 400 leaf-blower (Andreas Stihl AG & Co., 1999) with suction conversion kit, used with a D-vac net as a suction sampler. Pitfall traps were plastic cups with ethylene glycol (commercial anti-freeze) used as preservative, generally placed in a line of four traps (or ten, for shorter periods) at 2m intervals, with particular attention being given to ensuring that the plastic lip was covered by soil or vegetation.

Composite species data reported in Helden *et al.* (2008), for 40 commercial improved pastures from Leinster and east Munster, were summarised as total numbers divided by 40 (n/40), for comparative purposes in Table 2 (species where n/40 <0.5 are excluded). Data from Wexford in Helden *et al.* (2008) (a further 11 sites) was excluded because these included field margins (Anderson *et al.*, 2008). Also, data for *Stenus formicetorum* Mannerheim, 1843 cited as the third most abundant species in improved pastures by Helden *et al.* (2008), are excluded as its identity needs verification. It was found by Anderson (1997) to be uncommon and local in fens, but also occurs in wet meadows (Lott and Anderson, 2011). The only other grassland where the species was recorded as abundant was from a sheep pasture c.150m from residual bog soil in County Meath, based on dissected males (Good, 2011), although Allen (1989) also recorded it as abundant in a suburban haystack. However, the numbers (rounded mean of 21/site) mentioned in Helden *et al.* (2008) seem unlikely for this species.

Species data are tabulated according to 'dominant' species, which are those occurring in total samples at >9 individuals, 'subdominant' species, which are those occurring in total samples at <10 and >2, and 'present' species, which are those occurring in total samples as 1 or 2 only.

Staphylinidae were identified to species using keys and descriptions in a wide range of European publications, taking account of Spanish data on distribution summarised in the series of papers by Gamarra and Outerelo (2005, 2007, 2008, 2009a, b, c). Species from Galicia which could not be reliably determined are excluded from the results; these were only two species represented by one or two individuals. Aedeagi and/or (where relevant) spermathecae of representatives of most species were dissected to confirm their identity. Voucher specimens have been retained in the collection of JAG. Staphylinid nomenclature follows Löbl and Löbl (2015). Botanical nomenclature follows Stace (1997).

Results

In total, 159 species were recorded from 23 grassland and pasture sites (Tables 2 - 10), ranging from intensively managed dairy pasture to semi-natural *Sesleria* grassland and fixed dune vegetation.

Improved pastures

The two fields at Randalstown (County Meath) were ryegrass (*Lolium perenne* L.), meadow-grass (*Poa* sp.) and clover (*Trifolium repens* L.) pasture, grazed by both dry cattle and sheep. The structure of the staphylinid fauna (Table 2) was broadly similar to the average improved pasture from southern and eastern Ireland reported by Helden *et al.* (2008). However, both *Geostiba circellaris* (Gravenhorst, 1806) and *Xantholinus linearis* (Olivier, 1795) were dominant. *X. linearis* has only occasionally been reported as abundant in improved pastures (one site in Helden *et al.*, 2008), as well as in wheat fields (two sites in Good and Giller, 1990), but its co-occurrence with *G. circellaris* as a dominant (also only occasionally recorded) is unusual.

The Boora (County Offaly) site also had ryegrass/clover pasture, in this case grazed by dry cattle only. It had a typical improved pasture assemblage, dominated by *Amischa analis* (Gravenhorst, 1802), *Anotylus rugosus* (Fabricius, 1775), *Atheta* (*Mocyta*) *amplicollis* (Mulsant & Rey, 1874), *A.* (*M.*) *fungi* (Gravenhorst, 1806), *Philonthus carbonarius* (Gravenhorst, 1802), *P. cognatus* Stephens, 1832, *Tachinus rufipes* (Linnaeus, 1758), *Tachyporus pusillus* Gravenhorst, 1806 and *Stenus nanus* Stephens, 1833 (Table 3). Both *Anotylus rugosus* and *Tachinus rufipes* were dominant in the field with peat, but were in low numbers in the field without (Table 3). *Atheta fungi* was also dominant in the field with peat, but only present as a single individual in the field without peat, in contrast to *A. amplicollis* which was similarly dominant in both fields. The large number of adventive singletons associated with surrounding bog and birch wood habitats (e.g. *Aleochara brevipennis* Gravenhorst, 1806, *Atheta liliputana* (Brisout de Barneville, 1860), *A. subglabra* (Sharp, 1869), *A. zosterae* Thomson 1856) are no doubt derived from aerial plankton, and show how using species presence alone to compare sites can be misleading.

The pasture near Kenmare (County Kerry) was dominated by the three typical improved pasture *Philonthus* species and *Tachyporus pusillus* (Table 3). Compared to the Boora samples, the low numbers of the *Atheta fungi* group: *A. amplicollis* and *A. fungi* in the Kenmare site, and also at the Carrickittle (County Limerick) dairy pasture (Table 3), were as expected, given the bias of the sampling method (pitfall traps). It is clear from Table 3 how much more efficient suction sampling is for these two species. The silage field at Ardtully (County Kerry) could be distinguished from the above pastures by the high numbers of *Philonthus cognatus* (Table 6), a species which is abundant in cereal crops (Good and Giller, 1990), and readily colonises cropped nutrient-rich grasses.

Restored grasslands: road cuttings

The sample from the road cutting near Manorhamilton (County Leitrim) (Table 4) shows the effect of soil type (in this case gleyed fine-textured drumlin soil) on the staphylinid fauna, with *Staphylinus dimidiaticornis* Gemminger, 1851 dominant. The dominance of this species with *Stenus brunnipes* Stephens, 1833, *S. clavicornis* (Scopoli, 1763), *S. fulvicornis* Stephens, 1833 and *Tachyporus dispar* (Paykull, 1789) is characteristic of old pastures or meadows (Good and Giller, 1990), but with *Stenus picipes* Stephens, 1833 and *Tachinus rufipes* missing (as dominant).

A similar road cutting was sampled near Carrick-on-Shannon (County Leitrim), although with pitfall traps only. This sample (Table 4) had less numbers and less species, compared with Manorhamilton, but it had several *Gabrius trossulus* (Nordmann, 1837) (1♂3♀♀), a local species usually occurring in fens, cutover bogs and fluctuating floodplains (Anderson, 1997; Lott and Anderson, 2011), and probably originally derived from the seasonally flooded meadows on the nearby Shannon floodplain. The fact that the soil sampled on the cutting had been compacted by vehicle access may explain both its presence and the paucity of species. All specimens of *G. trossulus* were brachyptrous.

In contrast, the limestone till road cuttings near Tulla (County Clare) and at Ballydavid (County Galway), reported in Good and Wistow (1997), were dominated by *Drusilla canaliculata* (Fabricius, 1787), with no subdominant species (pitfall traps only), indicating seasonally dry conditions. The absence of this species from the sample near Newtownmountkennedy (County Wicklow) (Table 4) may be due to the sampling technique (suction sampler, rather than pitfall traps). The unique record (amongst the sites reported here) of the rarely-recorded *Sunius melanocephalus* (Fabricius, 1793) may indicate its establishment on the adjacent road cutting slope. This appears to be a coastal species in Ireland (Anderson, 1997), and more tolerant of dry conditions.

In between wet and dry soils were two other sites, near Moneygall (County Offaly) and Lissavoura (County Cork), both with *Tachinus rufipes* as dominant. However, they were distinctly different in that *Geostiba circellaris* was dominant near Moneygall, but absent at Lissavoura, and *Atheta amplicollis* was vice versa (Table 4). The cutting near Moneygall was botanically diverse with patches of open grass cover with *Dactylorhiza* sp. and *Anacamptis pyramidalis* (L.), and also with young ash (*Fraxinus excelsior* L.) and hawthorn (*Crataegus monogyna* Jacq.); grasses varied from *Cynosurus cristatus* L. and *Poa* sp. to *Anthoxanthum odoratum* L. and *Holcus lanatus* L. In contrast, the Lissavoura site was richer with grass/clover and *Ulex/Cystisus*; this may explain the relative abundance of *A. amplicollis* (cf. grassland with *Ulex* near Avoca (Good, 1999b)).

Restored grasslands: mine tailings and spoil

The sample (D-vac + pitfall traps) from the Randalstown (County Meath) tailings plot was the most productive staphylinid sample ever taken by the senior author, in any grassland. It contained 565 individuals of 38 species, of which 12 were dominant (i.e. n>10) (Table 5). The plot (450m^2) in question was a 2-year old ungrazed grass/clover sward established in silty-sand tailings (pH 7), amended before sowing with both a high rate (c. 40Mg/ha) organic amendment (containing a mixture of pig manure, peat, dried seaweed and sand ('Organic Gold')) and NPK fertilizer (500kg/ha 10.10.20), and sown to *Festuca rubra* L., *Agrostis stolonifera* L., *Poa compressa* L. and *Trifolium repens* (see Sassoon (1999) for details of the site). Possible explanations of this high abundance and diversity could be biotic: less predation due to delayed colonisation of ground-dispersing top arthropod predators, as the 450m^2 plot was isolated amongst bare tailings; or abiotic: an optimum combination of high fresh organic matter levels and sandy-silt soil.

Two generations later (October 1992), the species structure had changed considerably. Even taking into account the confounding effects on numbers that could be expected from a different season (May *versus* October), and year, as well as poorer sampling technique efficiency due to denser grass, there were clear differences in the species which were dominant in one sample, but absent in the other. The two dominant *Tachinus* species, associated with organic matter, as well as *Cypha laeviscula* (Mannerheim, 1830) and *Aloconota gregaria* (Erichson, 1839), were all absent; in contrast, *Stenus fulvicornis* Stephens, 1833, absent in the earlier sample was the most dominant species in the later sample, with dominant *Stenus ossium* Stephens, 1833 only a singleton previously, and subdominant *Ocypus olens* (Müller, O.F., 1764) absent previously (Table 5). The vegetation had distinctly changed too in response to lack of grazing, with clover-dominated patches giving way to dense *Festuca* 'thatch'.

The restored pasture on mine tailings at Gortrum (County Tipperary) also had clover-rich improved grassland established on zinc/copper/lead mine tailings with previous amendments of organic matter in the form of cattle slurry, sewage sludge and dairy industry waste. However, relative abundance was considerably lower in comparison with the Randalstown (and Boora) results (Tables 3 and 5); there were no dominant (n>10) species recorded; the most abundant species were *Amischa analis, Atheta amplicollis, Philonthus carbonarius* and *Stenus nanus*, a subset of the typical improved pasture species recorded at Boora. The elevated soil metal concentrations occuring at Gortdrum are unlikely to be directly responsible for this, as staphylinids are not generally directly inhibited by such concentrations in the soil (Hopkin, 1989), but possibly high levels of heavy metals may have affected prey populations. Another possible explanation may be the greater susceptibility of the fine-textured soil to alternate excessive flooding and drying due to poor drainage, and this may have prevented the development of populations of typical staphylinid species. At Randalstown, the plot sample was

closer to the discharge margin and thus may have had a higher sand component, and also it was younger with the decomposition of the organic matter at its peak. *Anotylus rugosus* and *Tachinus rufipes* were notably absent from the Gortdrum site, despite previous organic amendments. Also notable was the sub-dominance of *Gabrius appendiculatus* Sharp, 1910 (= *subnigritulus* sensu auct.), absent from the Randalstown sample (Table 5), although a single individual was recorded elsewhere on the site (Good, 2011). *G. appendiculatus* has been recorded from wet and floodplain grassland (Anderson, 1997; Lott and Anderson, 2011), but its exact habitat preference is not clear, and it has not been found in numbers at previously surveyed grassland sites in Ireland.

Two other species are of note. *Stenus canaliculatus* Gyllenhal, 1827 was dominant at Randalstown; it is a lakeshore species in Ireland of open silty/sandy substrate (Anderson, 1997), although it has also been recorded in numbers in improved pastures in wet soils in Belgium (Segers and Bosmans, 1982). Although *Sepedophilus nigripennis* (Stephens, 1832) was dominant in *Festuca* at Tynagh tailings (Good, 1999a: Table 6), it was in very low numbers at Randalstown and absent from Gortdrum tailings grassland.

The dominance (n = 36 & 16) of *Mycetoporus lepidus* (Gravenhorst, 1806) in the Ballymurtagh restored plots (Table 6), which would make this site an outlier due to its absence at other sites, is striking and unexpected. Anderson (1997) cites this species from silage and arable fields, but only one specimen was recorded by Good and Giller (1990) from over 40 such fields in south-west Ireland, and Helden *et al*. (2008) recorded only three individuals from over 50 agricultural grasslands in eastern Ireland. Its abundance may possibly be explained by a response to fungi growing on decaying sewage sludge incorporated into soil in this plot. Both Muouna and Rutanen (1994) and Majzlan and Fedor (2009) recorded increases in abundance of *M. lepidus* after forest fires in Finland and Slovakia, respectively, which they attribute to numerical responses to dipteran larvae and eggs developing in fungal fruiting bodies on burnt soil.

The Ballymurtagh results (Table 6) also show a significant difference in abundance between *Atheta amplicollis* (n>100) and *A. fungi* (n<10). This plot had a sewage sludge application, but no fertilizer. Another distinct characteristic of this site is the large numbers (240 in one sample) of *Tachinus rufipes*, which is a known associate of fresh organic matter such as dung (Horion, 1967).

The results from the pitfall trap sample at an old Pb/Cu mine at Ballyvergin (Table 6) was similar to that from the Carrick-on-Shannon road cutting, with poor diversity but with *Gabrius trossulus* (Nordmann, 1837) occurring in numbers (1♂3♀♀) (Table 6). Like the poorly-drained soil at the road cutting, the tailings at Ballyvergin may act as a 'stepping-stone' for dispersing *G. trossulus* from the nearbly organic-rich calcareous wetland pool soils occurring at this site. All specimens were brachypterous and would have dispersed cursorially.

Restored grasslands: mine spoil (Galicia)

The As Pontes site was a large active surface lignite mine, where overburden (mostly phyllite and clay) was deposited in what ultimately became a large hill, the surface of which was then restored to grasslands and young tree-plantings (Gil Bueno *et al*., 1990). The climate of this part of north-west Galicia is similar in many respects to south-west Ireland, but with greater summer temperatures and greater soil insolation in open swards. The striking point from the samples from As Pontes (Tables 7 and 8) is the similarity in species composition between the restored Galician and Irish grasslands. However, the greater insolation at As Pontes probably affected the key difference in relative abundance. Most samples were dominated by *Atheta amplicollis*, *Stenus impressus* (Germar, 1824) and *S. ossium* (Tables 7 and 8), a combination which was only observed in Irish samples from fixed dunes and island grassland on the coast of south Cork (Castlefreke and Cape Clear Island, Table 8); the common feature being higher soil temperatures at certain times of the year and an ungrazed sward. Also, notably, pitfall trap results were relatively poor compared to Irish samples (Tables 7 and 8), possibly for the same reason. In addition, only two individuals of *Tachinus rufipes* were recorded across all samples, even in fields with organic amendments, very probably due to the seasonally drier soil conditions which are inimical to its larvae (Lipkow, 1966).

Semi-natural pasture: turloughs

Lydacan Turlough (County Galway) had a typical turlough pasture fauna with *Carpelimus manchuricus* (Bernhauer 1938) (= *subtilicornis* (Roubal, 1946)), *Philonthus quisquiliarius* (Gyllenhal, 1810), *Platystethus nodifrons* Mannerheim 1830, *Stenus boops* Ljungh, 1810 and *S. fuscipes* Gravenhorst, 1802 as sub-dominant, and *Atheta* (*Philhygra*) *malleus* Joy, 1913, *Calodera aethiops* (Gravenhorst, 1802), *C. nigrita* Mannerheim, 1830, *Hygropora cunctans* (Erichson, 1837), and *Lathrobium quadratum* (Paykull, 1789) present (cf. Good and Butler, 2001: Table 1). A notable record is that of *Philonthus punctus* (Gravenhorst, 1802), which is only known in Ireland from a few of the many turlough/lakeshore sites in Clare, south-east Galway and Mayo which have been sampled (Owen, 1997; Good and Butler, 2001; Regan and Anderson, 2004; R. Anderson, pers. comm.). Much of Lydacan turlough pasture has poor (low nutrient) grassland vegetation according to Regan, Sheehy-Skeffington and Gormally (2007). The particular sward sampled here for rove-beetles was particularly moss-rich, and contained carices and *Hydrocotyle vulgaris* L. The relative abundance of species was generally similar to that for Garryland Turlough, sampled in the same year, but with the notable difference that *Tachinus rufipes* was dominant at Lydacan, but absent at Garryland. Lydacan was sampled slightly later in June than Garryland but this is still likely to be too early for the emergence of the next *T. rufipes* generation, so the difference may be ecological rather than sampling bias.

In contrast to Lydacan, Blackrock Turlough can be considered a semi-improved pasture, in that it is unlikely to have been ploughed and cultivated due to its slope and liability to flooding, but appears to have been improved by fertiliser and some ryegrass seed application. It was grazed by cattle and horses at the time of sampling. There are two significant differences to Lydacan Turlough. Firstly, Blackrock turlough fills and empties relatively rapidly and deeply, and as a consequence the soil does not have as stable an inundation regime as Lydacan and other turloughs. Secondly, it is partly filled by overflow eutrophic water from the Owenshree River, and the area sampled has a well-drained slightly acidic mineral soil, both combining to give a fertile soil (Sharkey *et al*., 2015). The staphylinid fauna shows the response to these combined factors by having relatively low diversity, being dominated by *Aloconota gregaria*, *Atheta fungi* and *Philonthus cognatus* (Table 9) which are rapidly dispersing species characteristic of nutrient-rich field crops, combined with relatively low numbers of characteristic turlough species, such as *Carpelimus manchuricus*, *Platystethus nodifrons* and *Stenus fuscipes* Gravenhorst, 1802 (Table 9), which are abundant in the surrounding landscape.

Semi-natural grasslands: sand dunes

D-vac samples from recently burnt (Table 10) and unburnt (Table 8) fixed dune vegetation at Castlefreke (County Cork) showed a dramatic change in staphylinid assemblage, with species characteristic of dry south-facing slopes (*Drusilla canaliculata* (Fabricius, 1787) and *Falagrioma thoracica* (Stephens, 1832) (see Good and Wistow, 1997) occurring in the recently burnt short sward, but absent in the unburnt sward. Contrariwise, *Stenus impressus* was dominant in the unburnt sward but absent in the recently burnt dunes.

The Doonbeg sample (Table 9) was from a winter (January) set of turf samples, so the dominance of *Amischa analis*, *Atheta amplicollis*, *Philonthus carbonarius*, *P. cognatus*, and the sub-dominance of *P. varians*, is probably due to beetles from the adjacent improved pastures overwintering in the dunes, rather than an indicator of nutrient enhancement. In contrast, the dominance of *Ischnosoma splendidum* (Gravenhorst, 1806), and the occurrence (at n>1) of *Ochthephilum fracticorne* (Paykull, 1800), *Tachyporus atriceps* (Stephens, 1832) and *T. tersus* Erichson, 1839 appear to be more characteristic of dune grassland. Anderson (1997) recorded *I. splendidum* as restricted to moss on sandy or light-textured soils.

Only one *Rugilus rufipes* (Germar, 1835) was found across all the sites, a male from Doonbeg sand dunes (Table 9), which is surprising given that Anderson (1997) mentioned it to be common in grassland in Northern Ireland. Perhaps the records of *R. similis*, from improved grassland, in Helden *et al*. (2008), a species of river and lake margins (Anderson, 1997), may refer to this species.

Semi-natural grasslands: calcareous grasslands

The co-occurrence of *Micropeplus staphylinoides* (Marsham, 1802) (dominant) and *Metopsia clypeata* (Müller, P.W.J., 1821), from limestone grassland at Clorhane (County Offaly) (Table 10), may be characteristic of calcareous grassland; the former has been recorded as dominant in mildly calcareous dunes (Redgate, 1981), and the latter dominant in old grassland on limestone soils (Good, 2011). This site was also at the margin of the floodplain of the River Shannon, and may also be occasionally inundated, and this proably explains the occurrence of a single individual of *Anthobium unicolor* (Marsham, 1802), a species typical of fens (Anderson, 1997) (and also the plant *Carex hostiana* DC (det. G. Doyle), a species typical of wet flushes, which was growing at this site).

The above three staphylinid species were absent from the Lough Derg lakeshore at Skehanagh (County Tipperary) (Table 10), but this site had an interesting alternative set of species, three of them myrmecophiles: *Drusilla canaliculata* (Fabricius, 1787), *Pella limbata* (Paykull, 1789) (both sub-dominant) and *Lamprinodes saginatus* (Gravenhorst, 1806) (present). The lakeshore contained a gradient from scrub and young trees (including *Sorbus hibernica* E.F. Warb.), through *Sesleria albicans* Kit. grassland with occasional *Juniperus communis* L. prostrate bushes, to *Schoenus nigricans* L. wetland. The grassland was ungrazed with a dry sward but with a moist soil surface layer with moss. *Carpelimus elongatulus* (Erichson, 1839), a local species also recorded as subdominant on the shore of Lough Gill, County Kerry (Good and Butler, 1998), indicated the lake shore flooding of the soil at this site.

The high numbers of *Tachyporus chrysomelinus* are surprising. Dominance of *T. chrysomelinus* (Linnaeus, 1758) in grassland samples is unusual; it can be dominant in samples from cereal crops (wheat, barley, etc.) (e.g. the Kanturk wheat sample in Good and Giller (1990)); also in wheat with high aphid densities in SE England (Bryan and Wratten, 1984). One possibility is that *T. chrysomelinus*, an aphid feeder, was attracted to aphid colonies on the scattered *Phragmites australis* (Cav.) plants at Skehanagh, which can be abundant on both wheat and reeds. Another possibility is that this sample was taken in April, when *T. chrysomelinus* is more abundant (Coombes and Sotherton, 1986), compared to later in the year for the other grassland samples reported here.

The occurrence of *Stenus aceris* Stephens, 1833, recorded from the lakeshore at Lough Derg by Anderson (2013) is also interesting, as this was considered to be a grassland species by Lott and Anderson (2011), and a species of open habitats on light soils in England by Reid (1985). In the Netherlands, *S. aceris* is only known from sand dunes in the south of the country (van Nunen *et al*., 2004). Perhaps the single specimen recorded by Anderson (2013) from Lough Derg shoreline derives from a population in *Sesleria/Juniperus* habitat.

Semi-natural grasslands: old meadows and pastures

The old meadow near As Pontes in Galicia had a distinctly different fauna to that of any other known Atlantic grassland site, characterised by dominance of *Stenus similis* (Herbst, 1784), absence of *S. ossium*, and subdominance or occurrence of a range of species rarely, or not, recorded in the restored sites at As Pontes, such as *Astenus gracilis* (Paykull, 1789), *Heterothops dissimilis* (Gravenhorst, 1802), *Rugilus geniculatus* (Erichson, 1839), *Stenus assequens* Rey, 1844 and *S. providus* Erichson, 1839 (= *rogeri* Kraatz, 1857) (Table 8). There appears to be few records of many staphylinid species from Galicia; for instance, the nearest records of *A. gracilis*, although widespread in Iberia, are from Santander (Cantabria) and Tras Os Montes (Portugal) (Gamarra and Outerelo, 2007). A range of species reported here are apparently new to Galicia; they are not recorded from Galicia by Gamarra and Outerelo (2005, 2007, 2008, 2009a, b, c). *Tachyporus dispar*, which occurred at As Pontes, has not apparently been recorded previously from the Iberian Peninsula (Gamarra and Outerelo, 2009a).

A very lightly-grazed old pasture on Cape Clear Island (County Cork) contained *Sepedophilus nigripennis* as dominant (Table 8), a species which occurs in high numbers in ungrazed and uncut dense grass swards, such as at the base of *Cytisus* and *Ulex* at As Pontes (Table 7) and at several sites in Counties Cork and Galway (Good, 1999a). Although not included in Table 8, 77 *Ocypus olens* were also recorded in 20 pitfall traps at the Cape Clear site, a result similar to that from cliff-top *Festuca rubra* grassland at Galley Head (County Cork) (Good, 1999a). An explanation for the absence of this species from similar coastal habitat at Knockmahon mine (County Waterford) (Good, 1999a: Table 6) could be the effects of higher soil copper concentrations inhibiting large invertebrates, which are predated by *O. olens*. The absence of this species from As Pontes could also be due to low numbers of invertebrate prey, which had not colonised the recently restored meadows.

Suction samplers* versus *pitfall traps

The most dramatic difference in effectiveness of these two techniques for *Stenus* species is shown in the sample from grass under *Cytisus/Ulex* from As Pontes (Table 7), where 130 *Stenus impressus* and 45 *Stenus ossium* were collected by S-vac, but neither occurred in pitfall traps operating at the same time. Both these, in common with some other grassland *Stenus*, possess bilobed 4th tarsal segments adapted for climbing grasses and other vegetation (Renkonen, 1934), and may be able to climb out of pitfall traps. Alternatively, they may simply avoid the traps, as is indicated by the significantly higher numbers of *S. canaliculatus*, a species lacking bilobed tarsi, in the D-vac sample (n = 20) compared to pitfall traps (n = 0), at Randalstown (Table 5).

Contrariwise, 17 *Staphylinus dimidiaticornis* were recorded in pitfall traps from Skehanagh, but none in D-vac suction samples (Table 10). A similar result occurred near Manorhamilton (Table 4). Relatively large, nocturnally-active, litter-layer beetles, which hide away during the

day are less likely to be captured by diurnal suction sampling. It can be seen from the tables that suction samples considerably underestimate staphylinines, *Tachinus* and *Anotylus* species.

Tachinus rufipes

Tachinus rufipes (= *signatus*) appears to be particularly related to soil organic matter across the spectrum from improved to semi-natural grassland, occurring in high numbers in sewage sludge-amended soil, dominant in some improved pastures, in one case with residual peat where it was in low numbers without, as well as in road cuttings and restored soils, and in all cases in soils with good moisture retention. High numbers were also recorded in upland *Molinia caerulea* tussock grassland in County Wicklow (Good, 1999c). The larvae of this species require moist soil with 100% relative humidity for their development (Lipkow, 1966). However, great care is needed in comparing relative abundance of *T. rufipes* between sites. For the road cuttings, it would be expected that *T. rufipes* would occur in greater numbers near Manorhamilton (County Leitrim) (drumlin clay cutting moist litter layer and dense vegetation creating organic matter) than near Moneygall (County Offaly) (moraine boulder clay with more open, sparse vegetation cover). However, the opposite was the case. This could be possibly explained by the subtle difference in sampling timing: Moneygall was sampled one week later in July than Manorhamilton, and also taking into account the more south-facing aspect and more southern location of the former, a new generation of *T. rufipes* may have emerged here at the end of the sampling period, but had not emerged yet for the earlier-concluded samples near Manorhamilton.

Atheta amplicollis and A. fungi

The most abundant taxon *recorded* from Irish grasslands was the *Atheta fungi* species-complex (Tables 2-9; see also Helden *et al*., 2008), of which *Atheta amplicollis* and *A. fungi* were, for the most part, separated here. (Note *recorded* is emphasised, as *Amischa analis* is under-represented in pitfall traps and suction samples, compared to soil samples (JAG, unpublished data), and may be more abundant). *A fungi* sensu stricto appears to be parthenogenetic and represented by females only in Ireland (Good, 2019). It was recently hypothesised that *A. fungi* was dependant on fresh decomposing grass with high nutrient levels (with consequential fungal and algal growth) (Good, 2019). However, the data here indicates that the habitat separation between these two sibling species is more complex.

At the As Pontes site (Tables 7 and 8), *A. fungi* was only dominant in parcels with greater nutrient availability, such as manured grassland and areas with nitrogen-fixing plants such as *Alnus glutinosa* (L.) and *Cytisus* sp. or *Ulex europaeus* L. However, this conclusion is confounded by the fact that organic rich soil and soils under tree cover may both have increased soil moisture retention. Also, contrariwise, nine *A. amplicollis* were captured under *Ulex*

europaeus in revegetated copper tailings at Avoca (County Wicklow) (Good, 1999b), and 28 under *U. europaeus* at the Lissavoura road cutting (Table 4), but only zero and five *A. fungi*, respectively.

At Boora (Table 3), *A. fungi* was abundant in soil with residual peat (n = 39), and much higher cover of the nitrogen-fixing clover *Trifolium repens*, but represented by only one individual in soil without residual peat and low clover. However, there was a more than 10-fold higher number of *A. amplicollis* compared to *A. fungi* in the sewage sludge-amended soil at Ballymurtagh (Table 6).

A. amplicollis is not listed by Gamarra and Outerelo (2005) as occurring in Spain, but it is included as a synonym of *A. fungi*. However, both appear to have not been previously recorded from Galicia (Gamarra and Outerelo, 2005).

Discussion

The results show distinct differences between staphylinid species relative abundance within improved, restored and semi-natural grasslands. This may sometimes be due to fresh organic matter, soil moisture, flood regime and also due to biases of sampling due to season or technique.

From a botanical perspective, Sullivan *et al.* (2010) recognised a separate category of 'semi-improved' grassland, where there are greater abundances of certain grasses and herbs not associated with the more nutrient-rich reseeded grasslands. It is likely that the staphyinid fauna will change similarly, with extra species becoming more abundant than is the case in ryegrass swards. This will especially be the case in grasslands originally reseeded to ryegrass but with subsequent lower nutrient inputs. These are perhaps better referred to as 'reverting improved grassland', an example being the Randalstown pasture (Table 2) where *Xantholinus linearis* and *Geostiba circellaris* were dominant, although generally not abundant in improved grasslands. 'Reverting improved grassland' is likely to have lower nutrient inputs, and will have a changed structure with loss of the nitrophilous species and dominance, for instance, of species such as *Stenus* species other than *nanus* and *clavicornis*; examples are the change at the Randalstown organic-amended plot over two generations (Table 5), and the fauna of the originally manured field at As Pontes (Table 8).

In general, the species composition of the restored grasslands from As Pontes (Galicia) (Tables 7 and 8) was similar to that recorded in Ireland. However, the co-dominance of *Stenus impressus* and *Stenus ossium*, which occurred in most of the samples from As Pontes (Galicia) was only recorded to occur in Ireland from two south-coast sites (Table 8). *S. impressus* was alone dominant in samples from limestone grassed cliffs in the Burren, County Clare (Good, 2004); a habitat which Jeffrey (2003) argued to be resistant to scrub invasion due to soil dryness and low fertility. This shows the similarity of edaphic conditions in sandy and rendzina soils in

southern Ireland to climatic conditions in heavier textured raw soils in north-west Spain. In contrast, natural flat loam soils in Galicia with greater water retention had a different structure, with *Stenus similis* (Herbst) dominant and *S. ossium* absent (Table 8 - 'Herb').

Old semi-natural grasslands with historical continuity possess more differentiated faunas, such as turlough pastures and limestone grasslands. Turloughs such as Lydacan are characterised by flood-adapted species with restricted distributions. Similarly, *Sesleria* grassland characteristically occurs on shallow limestone soils (O'Donovan, 1995), in the case of Skehanagh probably created by lakeshore wave-action when water levels were historically unregulated. The staphylinid fauna of lake-shore *Sesleria - Juniperus* grassland of the north-east Lough Derg (County Tipperary), as well as other suitable sites where it occurs such as at Lough Carra (County Mayo) (Praeger, 1906), would be well worth further investigation.

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TABLE 1. Details of sites and sampling methods for grasslands and pastures.

Improved and reverting improved pastures

Randalstown, Co. Meath (N852723) Moderately-grazed sheep + cattle *Lolium perenne*/*Poa* sp. pasture. Pitfall traps (n = 4) (2 subsites) - 20 May - 10 June 1992; D-vac sampler (2 subsites) - 20 May 1992.

Boora, Co. Offaly (N1622) Improved cattle-grazed *Lolium perenne*/*Trifolium repens* pasture on cut-over bog (with and without residual peat). Pitfall traps (n = 4) (2 subsites) - 28 June - 19 July 1991; D-vac sampler (2 subsites) - 19 July 1991.

Near Kenmare, Co. Kerry (V927714) Improved cattle-grazed pasture with *Agrostis stolonifera, Holcus lanatus*, *Poa* sp., *Ranunculus repens* with very occasional *Iris pseudacorus*. Pitfall traps (n = 4); 12 June - 3 July 1991.

Carrickittle, Co. Limerick (R7439) Intensively managed dairy paddock, regrowth following silage cut (early June). Pitfall traps (n = 4) - 12 - 31 July 1991.

Blackrock Turlough, Co. Galway (M49730809) Sheep/horse/cattle heavily-grazed pasture with *Potentilla anserina*. Pitfall traps (n = 4) - 2 - 23 June 1996.

Restored grasslands - road cuttings

Near Manorhamilton, Co. Leitrim (G867361) Road cutting: east-facing slope on cutting through drumlin gleyed soil/subsoil, with *Holcus lanatus*, *Trifolium repens*, *Cynosurus cristata*, *Anthoxanthum odoratum*, *Potentilla anserina*, *Carex flacca*, *Plantago lanceolata, Juncus conglomeratus* and *Leucanthemum vulgare*. Pitfall traps (n = 4) - 26 June - 22 July 1991; D-vac suction sampler - 22 July 1991.

Carrick-on-Shannon, Co. Leitrim (M97419819) Compacted clay at crest of road cutting, sparse grasses, *Carex flacca* and *Plantago lanceolata.* Pitfall traps (n=4) - 25 June - 20 July 1991.

Near Moneygall, Co. Offaly (S0181808) Road cutting through fine-textured boulder clay, open totussock grassland. Pitfall traps (n = 4) - 14 - 31 July 1991.

Lissavoura, Co. Cork (W58118770) South-facing road cutting slope, rough grass & *Cytisus scoparius/Ulex europaeus*. Pitfall traps (n = 4) - 12 - 31 July 1991.

Newtownmountkennedy, Co. Wicklow (O27430619) Roadside cut grass/*Trifolium repens* strip below rough grassland slope. D-vac suction sampler - 15 June 1991.

Restored grasslands - mine tailings & spoil

Randalstown, Co. Meath (N85387205) Ungrazed *Festuca/Agrostis/Trifolium repens* on Zn/Pb tailings with high organic amendment. D-vac suction sampler - 17 June 1991, 9 October 1992; Pitfall traps (n = 4) - 17 June - 8 July 1991, 24 September - 29 October 1992.

Gortdrum, Co. Tipperary (R86924053) *Agrostis*/*Festuca*/moss cattle pasture on Cu/Zn/Pb mine tailings. Pitfall traps (n = 4) - 5 - 26 July 1991; D-vac suction sampler - 31 June 1991.

TABLE 1 (continued).

Ballymurtagh, Co. Wicklow (T19348147) Two-year old grass on sewage sludge-amended topsoil on (a) heavy-duty polyethylene (HDPE) barrier over acidic mine spoil, and (b) mine spoil planted with *Betula* saplings. Pitfall traps (n = 4) (2 subsites) - 24 June - 16 July 1998.
Ardtully, Co. Kerry (V974731) Silage field (second cut crop) on Cu-enriched mine spoil soil. Pitfall traps (n = 4) - 12 June - 3 July 1991.
Ballyvergin, Co. Clare. (R4281) Patch of wet grassland (*Anthoxanthum*, *Holcus*, *Poa*) on Pb/Cu mine tailings near *Ulex europeaus* and *Juncus effusus*. Pitfall traps (n = 4) - 12 - 31 July 1991.
As Pontes de Garcia Rodriguez, La Coruña (29T 58605E 481310N) Open grassland slope with scattered scrub on topsoiled mine spoil. Pitfall traps (n = 10) - 21 - 25 June 1993; S-vac suction sampler - 24 June 1993.
As Pontes de Garcia Rodriguez, La Coruña (29T 58601E 481331N) Meadow with *Holcus lanatusTrifolium repens* on phyllite spoil. Pitfall traps (n = 10) - 16 - 21 June 1993; S-vac suction sampler - 14 June 1993.
As Pontes de Garcia Rodriguez, La Coruña (29T 58525E 481335N) Grassland with *Cytisus* sp. and *Ulex europaeus* scrub on topsoiled mine spoil. Pitfall traps (n = 10) - 16 - 21 June 1993; S-vac suction sampler - 14 June 1993.
As Pontes de Garcia Rodriguez, La Coruña (29T 58791E 481330N) Grassland established for nine years on clay without topsoil. Pitfall traps (n = 10) - 16 - 22 June 1993; S-vac suction sampler - 16 June 1993.
As Pontes de Garcia Rodriguez, La Coruña (29T 58598E 481343N) Grass with 4-year *Pinus* spp on topsoiled acidic phyllite spoil. Pitfall traps (n = 10) - 15 - 21 June 1993; S-vac suction sampler - 15 June 1993.
As Pontes de Garcia Rodriguez, La Coruña (29T 58501E 481328N) Organic manured grassland established for 2 years on phyllite spoil. Pitfall traps (n = 10) - 15 - 22 June 1993; S-vac suction sampler - 15 June 1993.
As Pontes de Garcia Rodriguez, La Coruña (29T 58499E 481348N) Grass with 4-year *Alnus glutinosa* on topsoiled acidic phyllite spoil. Pitfall traps (n = 10) - 17 - 22 June 1993; S-vac suction sampler- 17 June 1993.

Semi-natural grasslands
Lydacan Turlough, Co. Galway (M438083) Moss-dominated turlough cattle pasture with carices and *Hydrocotyle vulgaris.* Pitfall traps (n = 4) - 15 May - 21 June 1996.
Doonbeg Dunes, Co. Clare (Q994688) Cattle-grazed fixed dune hollow moss-rich turf, sparse vascular plant cover. Turve samples (n = 10) - 14 January 1998.

As Pontes de Garcia Rodriguez, La Coruña (29T 59377E 480980N) Herb-rich old meadow on moist silty loam soil. Pitfall traps (n = 10) - 21 - 24 June 1995; S-vac suction sampler - 24 June 1995.

TABLE 1 (continued).

Castlefreke Dunes, Co. Cork (W336339) Short-turf (recovering from recent burning) and unburnt fixed acidic sand dunes. D-vac suction sampler (x 2) - 11 July 1985 (00:30 - 01:30h GMT).
Cape Clear Island, Co. Cork (V958212) Ungrazed rough grassland. D-vac suction sampler (x 2) - 23 August 1984.
Skehanagh (L. Derg), Co. Tipperary (R816914) Lake shore grassland with *Sesleria caerulea* and *Juniperus communis*, grading into *Schoenus nigricans* sward with *Pinguicula vulgaris*, etc. Pitfall traps (n = 4 x 2) - 28 April - 3 June 1993; S-vac suction sampler - 28 April 1993.
Clorhane, Co. Offaly (M98712806) Limestone pasture with rock outcrops grazed by cattle & occasionally flooded in winter. Pitfall traps (n = 4) - 12 August - 20 September 1986.

TABLE 2. Staphylinid beetles recorded from improved pastures at Randalstown (Co. Meath), compared with derived mean abundance/site from Helden *et al*. (2008) from 40 commercial improved pastures in Leinster and east Munster (see Methods). Many Aleocharinae were not determined by Helden *et al*. (2008); these are represented by '?'. * = *A. fungi* s.l. (sensu lato) includes *A. amplicollis* and *A. fungi*, which were not differentiated by Helden *et al.* (2008).

Species	***Randalstown 1***			***Randalstown 2***			***Helden et al. (2008)***
	D-vac	*Traps*	*Total*	*D-vac*	*Traps*	*Total*	*Total/site*
Amischa analis	25	25	**50**	40	10	**50**	**77**
Atheta amplicollis	27	29	**56**	51	14	**65**	}
Atheta fungi	38	5	**43**	102	4	**106**	}**102***
Geostiba circellaris	1	9	**10**	-	-	-	**?**
Philonthus carbonarius	-	4	**4**	1	9	**10**	**6**
Philonthus laminatus	-	10	**10**	-	14	**14**	**13**
Tachinus rufipes	-	23	**23**	1	8	**9**	**7**
Tachyporus dispar	2	7	**9**	11	3	**14**	**4**
Tachyporus hypnorum	3	4	**7**	13	7	**20**	**2**
Tachyporus pusillus	4	18	**22**	25	41	**66**	**7**
Xantholinus linearis	-	21	**21**	-	10	**10**	**1**
Aloconota gregaria	-	1	**1**	2	2	**4**	**16**
Oligota inflata	-	-	-	2	2	**4**	**?**
Oxypoda brachyptera	1	-	**1**	1	2	**3**	**?**
Philonthus cognatus	-	3	**3**	1	8	**9**	**17**
Philonthus marginatus	-	-	-	-	2	**2**	**1**
Stenus clavicornis	3	4	**7**	1	-	**1**	**7**
Stenus nanus	1	-	**1**	1	2	**3**	**8**
Stenus picipes	-	-	-	1	2	**3**	**10**
Tachyp. chrysomelinus	2	1	**3**	1	-	**1**	**4**
Tachyporus nitidulus	6	-	**6**	6	-	**6**	**1**
Xantholinus longiventris	-	2	**2**	1	5	**6**	**1**
Acrotona aterrima	-	-	-	1	-	**1**	**?**
Aleochara lanuginosa	-	-	-	-	1	**1**	**1**

TABLE 2 (continued).

Species	Randalstown 1			Randalstown 2			Helden et al. (2008)
	D-vac	*Traps*	*Total*	*D-vac*	*Traps*	*Total*	*Total/site*
Amischa decipiens	-	-	-	2	-	**2**	**14**
Amischa nigrofusca	-	-	-	-	-	-	**2**
Anotylus rugosus	-	1	**1**	-	-	-	**3**
Anotylus tetracarinatus	-	1	**1**	-	-	-	**1**
Atheta indubia	-	-	-	-	2	**2**	**?**
Atheta nigripes	-	-	-	-	1	**1**	**?**
Callicerus obscurus	-	-	-	-	1	**1**	**?**
Carpelimus corticinus	-	-	-	1	-	**1**	-
Dinaraea angustula	-	1	**1**	-	-	-	**?**
Micropeplus porcatus	-	-	-	1	-	**1**	-
Philonthus varians	1	-	**1**	-	-	-	-
Platystethus arenarius	-	-	-	-	-	-	**1**
Quedius levicollis	-	-	-	-	-	-	**1**
Quedius schatzmayri	-	2	**2**	-	-	-	**1**
Stenus brunnipes	-	-	-	-	-	-	**3**
Stenus canaliculatus	-	-	-	-	-	-	**1**
Stenus cicindeloides	-	-	-	1	-	**1**	**3**
Stenus fulvicornis	-	-	-	-	-	-	**1**
Stenus juno	-	-	-	-	-	-	**1**
Stenus ossium	-	-	-	-	-	-	**1**
Stenus similis	-	-	-	-	-	-	**1**
Stenus tarsalis	-	-	-	1	-	**1**	**3**
Sunius propinquus	1	1	**2**	-	-	-	-
Tinotus morion	-	1	**1**	1	1	**2**	-

TABLE 3. Staphylinid beetles recorded from improved pasture: On cut-over bog with residual peat ('+ peat'), and without peat ('- peat') at Boora (Co. Offaly); on alluvial soil near woodland near Kenmare ('Knmr') (Co. Kerry); and from dairy pasture at Carrickittle ('Cittle') (Co. Limerick).

Species	***Boora + peat***			***Boora - peat***			***Kenmr***	***Cittle***
	D-vac	*Traps*	*Total*	*D-vac*	*Traps*	*Total*	*Traps*	*Traps*
Amischa analis	6	2	**8**	29	1	**30**	3	-
Anotylus rugosus	-	14	**14**	-	6	**6**	-	-
Atheta amplicollis	23	5	**28**	36	6	**42**	3	6
Atheta fungi	37	2	**39**	1	-	**1**	-	3
Philonthus carbonarius	1	15	**16**	-	8	**8**	37	20
Philonthus cognatus	-	16	**16**	-	9	**9**	28	14
Philonthus laminatus	-	6	**6**	-	-	-	20	8
Stenus nanus	1	8	**9**	5	7	**12**	2	-
Tachinus rufipes	-	11	**11**	-	3	**3**	2	83
Tachyporus dispar	6	9	**15**	3	3	**3**	-	-
Tachyporus pusillus	6	9	**15**	15	4	**19**	12	1
Philonthus marginatus	-	-	-	-	5	**5**	2	2
Stenus ossium	1	-	**1**	4	-	**4**	-	-
Stenus picipes	-	-	-	8	-	**8**	-	-

TABLE 3 (continued).

Species	***Boora + peat***			***Boora - peat***			***Kenmr***	***Cittle***
	D-vac	*Traps*	*Total*	*D-vac*	*Traps*	*Total*	*Traps*	*Traps*
Tachyporus nitidulus	2	1	**3**	-	1	**1**	-	1
Tachinus laticollis	-	2	**2**	-	-	-	3	7
Acrotona parvula	-	-	-	-	1	**1**	-	-
Aleochara brevipennis	-	2	**2**	-	1	**1**	-	-
Aleochara intricata	-	-	-	-	1	**1**	-	-
Aleochara lanuginosa	-	1	**1**	-	-	-	-	-
Aloconota gregaria	1	-	**1**	-	-	-	-	-
Amischa decipiens	-	-	-	1	-	**1**	-	-
Atheta amicula	-	-	-	1	-	**1**	-	-
Atheta elongatula	-	1	**1**	-	-	-	-	-
Atheta indubia	1	-	**1**	-	-	-	-	-
Atheta liliputana	-	-	-	-	1	**1**	-	-
Atheta longicornis	1	-	**1**	-	-	-	-	-
Atheta melanocera	1	-	**1**	-	-	-	-	-
Atheta occulta	-	-	-	-	1	**1**	-	-
Atheta subglabra	-	-	-	-	-	-	1	-
Atheta triangulum	-	-	-	-	-	-	1	-
Atheta zosterae	-	-	-	-	-	-	1	-
Bisnius sordidus	-	1	**1**	-	-	-	-	-
Boreophilia eremita	1	-	**1**	-	-	-	-	-
Gabrius breviventer	1	-	**1**	1	-	**1**	-	-
Geostiba circellaris	-	-	-	-	-	-	-	1
Megalinus glabratus	-	-	-	-	1	**1**	-	-
Meotica exilis	-	1	**1**	-	-	-	-	-
Micropeplus porcatus	-	-	-	-	1	**1**	-	-
Ocypus aeneocephalus	-	-	-	-	-	-	-	2
Oxypoda exoleta	-	-	-	-	1	**1**	-	-
Oxypoda brevicornis	-	-	-	-	1	**1**	-	-
Philonthus decorus	-	-	-	-	-	-	-	1
Philonthus intermedius	-	-	-	-	2	**2**	-	-
Philonthus ?-micantoides	-	-	-	-	1	**1**	-	-
Philonthus splendens	-	1	**1**	-	1	**1**	-	2
Philonthus varians	-	-	-	-	-	-	2	1
Platystethus arenarius	1	-	**1**	-	-	-	-	-
Quedius levicollis	-	-	-	-	2	**2**	-	.. -
Quedius molochinus	-	-	-	-	-	-	-	1
Quedius schatzmayri	-	-	-	-	-	-	2	-
Stenus canaliculatus	1	-	**1**	-	-	-	-	-
Tachyporus chrysomelinus	1	-	**1**	-	1	**1**	-	-
Tachyporus hypnorum	2	-	**2**	-	-	-	-	-
Xantholinus linearis	-	-	-	-	-	-	-	1
Xantholinus longiventris	-	2	**2**	-	1	**1**	3	-

TABLE 4. Staphylinid beetles from road cutting grasslands: Near Manorhamilton (Co. Leitrim); near Carrick-on-Shannon (Co. Leitrim) ('Carrick'); near Moneygall (Co. Offaly) ('Mgall'); Lissavoura (Co. Cork) ('Lissa'); near Newtownmountkennedy (Co. Wicklow) ('Ntmk'). Traps = pitfall traps (n=4).

Species	***Manorhamilton***			***Carrick***	***Mgall***	***Lissa***	***Ntmk***
	D-vac	*Traps*	*Total*	*Traps*	*Traps*	*Traps*	*D-vac*
Amischa analis	-	1	**1**	2	7	10	-
Atheta amplicollis	3	-	**3**	1	-	28	3
Geostiba circellaris	-	1	**1**	5	26	-	-
Staphylinus dimidiaticornis	-	11	**11**	1	-	-	-
Stenus brunnipes	26	1	**27**	-	2	-	-
Stenus clavicornis	10	3	**13**	1	-	-	-
Stenus fulvicornis	15	3	**18**	-	1	-	-
Tachinus rufipes	-	6	**6**	1	23	20	-
Tachyporus dispar	13	1	**14**	1	-	1	-
Anotylus rugosus	-	3	**3**	6	-	-	-
Atheta elongatula	-	4	**4**	-	1	-	-
Atheta fungi	2	-	**2**	2	2	5	5
Gabrius trossulus	-	-	-	4	-	-	-
Megalinus glabratus	-	-	-	-	-	8	-
Philonthus cognatus	-	8	**8**	-	2	-	-
Quedius fuliginosus	-	3	**3**	-	-	-	-
Tachyporus hypnorum	-	-	-	-	-	1	7
Tachyporus nitidulus	-	-	-	-	1	-	7
Xantholinus linearis	-	-	-	-	3	-	-
Aloconota gregaria	1	-	**1**	-	1	1	-
Amischa nigrofusca	1	-	**1**	-	-	-	1
Atheta clientula	-	-	-	-	2	-	-
Atheta zosterae	-	-	-	-	1	-	-
Callicerus obscurus	-	-	-	1	1	2	-
Carpelimus corticinus	-	2	**2**	-	-	-	-
Cordalia obscura	-	-	-	-	-	-	-
Encephalus complicans	1	-	**1**	-	-	-	-
Lathrobium fulvipenne	-	2	**2**	-	-	-	-
Mycetoporus longulus	-	-	-	-	-	1	-
Ocypus olens	-	-	-	-	-	1	-
Philonthus carbonarius	-	1	**1**	-	1	2	-
Philonthus varians	-	-	-	-	1	-	-
Quedius fumatus	-	1	**1**	-	-	-	-
Quedius molochinus	-	-	-	-	1	2	-
Quedius levicollis	-	-	-	-	-	2	-
Quedius schatzmayri	-	-	-	-	-	-	1
Sepedophilus nigripennis	-	-	-	-	1	-	-
Staphylinus erythropterus	-	1	**1**	-	-	-	-
Stenus bimaculatus	-	1	**1**	-	-	-	-
Stenus impressus	-	-	-	-	-	-	-
Stenus ossium	1	-	**1**	-	-	-	1
Stenus picipes	1	-	**1**	-	-	-	-
Stenus similis	-	-	-	-	-	-	2
Sunius melanocephalus	-	-	-	-	-	-	1
Tinotus morion	-	-	-	-	1	-	-

TABLE 5. Staphylinid beetles recorded from restored mine tailings grasslands: Randalstown (Co. Meath) high-organic ungrazed grass plot; Gortdrum (Co. Tipperary) tailings pasture; 'Traps' - pitfall traps. * = *A. fungi* s.l. (sensu lato) includes *A. amplicollis* and *A. fungi*, which were not differentiated in this sub-sample.

Species	***Randals. June 1991***			***Randals. Oct. 1992***			***Gortdrum pasture***		
	D-vac	*Traps*	*Total*	*D-vac*	*Traps*	*Total*	*D-vac*	*Traps*	*Total*
Aloconota gregaria	4	9	**13**	-	-	-	-	-	-
Amischa analis	15	1	**16**	4	1	**5**	6	1	**7**
Atheta amplicollis	25	}215*	}**253***	19	3	**22**	4	5	**9**
Atheta fungi	13	}	}	14	1	**15**	2	-	**2**
Cypha laeviuscula	25	1	**26**	-	-	-	-	-	-
Stenus canaliculatus	20	-	**20**	-	1	**1**	1	-	**1**
Stenus clavicornis	9	4	**13**	5	-	**5**	-	-	-
Stenus fulvicornis	-	-	-	52	-	**52**	-	-	-
Stenus nanus	45	-	**45**	5	-	**5**	7	2	**9**
Stenus ossium	1	-	**1**	28	-	**28**	-	-	-
Tachinus laticollis	-	20	**20**	-	-	-	-	-	-
Tachinus rufipes	1	66	**67**	-	-	-	-	-	-
Tachyporus hypnorum	18	4	**22**	11	-	**11**	-	-	-
Tachyporus pusillus	3	13	**16**	6	-	**6**	1	3	**4**
Acrotona aterrima	-	5	**5**	-	-	-	-	-	-
Amischa decipiens	2	1	**3**	-	-	-	-	-	-
Atheta (*Mocyta*) sp.	3	-	**3**	-	-	-	-	-	-
Gabrius appendiculatus	-	-	-	-	-	-	-	3	**3**
Ischnosoma splendidum	-	3	**3**	-	-	-	-	-	-
Megarthrus denticollis	-	4	**4**	-	-	-	-	-	-
Metopsia clypeata	-	-	-	4	-	**4**	-	-	-
Ocypus olens	-	-	-	-	7	**7**	-	-	-
Oxypoda brevicornis	-	6	**6**	-	-	-	-	1	**1**
Oxypoda exoleta	-	3	**3**	-	-	-	-	-	-
Philonthus addendus	-	3	**3**	-	-	-	-	-	-
Philonthus carbonarius	1	5	**6**	-	-	-	-	7	**7**
Quedius schatzmayri	-	5	**5**	-	4	**4**	-	-	-
Sepedophilus nigripennis	-	-	-	3	-	**3**	-	-	-
Stenus brunnipes	2	6	**8**	2	1	**3**	2	-	**2**
Stenus cicindeloides	1	-	**1**	3	-	**3**	-	-	-
Stenus picipes	6	-	**6**	2	-	**2**	-	-	-
Tachyporus dispar	1	-	**1**	1	-	**1**	2	1	**3**
Xantholinus longiventris	-	1	**1**	-	-	-	-	1	**1**
Acrotona pygmaea	1	-	**1**	-	-	-	-	-	-
Anotylus tetracarinatus	1	1	**2**	-	-	-	-	-	-
Atheta atramentaria	1	-	**1**	-	-	-	-	-	-
Atheta celata	-	2	**2**	-	-	-	-	-	-
Atheta clientula	-	1	**1**	2	-	**2**	-	-	-
Atheta graminicola	-	1	**1**	-	-	-	-	-	-
Atheta orbata	-	1	**1**	-	-	-	-	-	-
Atheta triangulum	2	2	**4**	-	-	-	-	-	-
Autalia impressa	-	1	**1**	-	-	-	-	-	-

TABLE 5 (continued).

Species	Randals. June 1991			Randals. Oct. 1992			Gortdrum pasture		
	D-vac	Traps	Total	D-vac	Traps	Total	D-vac	Traps	Total
Autalia rivularis	-	-	-	-	1	**1**	-	-	-
Geostiba circellaris	-	2	**2**	-	-	-	-	-	-
Oligota inflata	-	-	-	1	-	**1**	-	-	-
Oxypoda haemorrhoa	-	1	**1**	-	-	-	-	-	-
Oxytelus laqueatus	-	-	-	-	-	-	-	1	**1**
Philonthus intermedius	-	-	-	-	1	**1**	-	-	-
Philonthus laminatus	-	-	-	-	-	-	-	1	**1**
Proteinus brachypterus	-	-	-	1	-	1	-	-	-
Quedius levicollis	-	1	**1**	-	2	**2**	-	-	-
Quedius molochinus	-	1	**1**	-	-	-	-	-	-
Quedius nitipennis	-	-	-	-	-	-	-	1	**1**
Rugilus orbiculatus	-	-	-	1	-	**1**	-	-	-
Stenus fulvicornis	-	-	-	-	-	-	1	-	**1**
Stenus impressus	-	-	-	1	-	**1**	-	-	-
Stenus incrassatus	1	-	**1**	-	-	-	-	-	-
Tachyporus chrysomelinus	2	-	**2**	2	-	**2**	-	-	-
Tachyporus nitidulus	-	1	**1**	1	-	**1**	-	-	-
Tachyporus obtusus	-	-	-	1	-	**1**	-	-	-
Tinotus morion	-	-	-	-	-	-	-	1	**1**

TABLE 6. Staphylinid beetles recorded from restored mine spoil grassland (with sewage sludge application) at Ballymurtagh (Co. Wicklow); a silage crop on top-soiled Cu spoil at Ardtully (Co. Kerry); and naturally vegetated mine tailings at Ballyvergin (Co. Clare). All sites were sampled by pitfall traps only.

Species	***Ballymurtagh***		***Ardtully***	***Ballyvergin***
	Grass	*Saplings*		
Atheta amplicollis	112	68	-	-
Mycetoporus lepidus	36	16	-	-
Philonthus carbonarius	-	-	20	-
Philonthus cognatus	12	2	67	-
Tachinus laticollis	-	13	-	-
Tachinus rufipes	142	240	2	1
Aloconota gregaria	-	-	8	-
Amischa analis	1	3	-	-
Atheta fungi	8	5	-	-
Gabrius trossulus	-	-	-	4
Geostiba circellaris	-	1	-	3
Philonthus laminatus	1	2	4	-
Sepedophilus nigripennis	3	-	-	-
Stenus clavicornis	1	2	-	-
Tachyporus dispar	4	1	-	-
Xantholinus longiventris	3	1	-	-
Acrotona pygmaea	-	1	-	-
Aleochara lanuginosa	-	-	1	-
Anotylus sculpturatus	1	-	-	-
Cypha laeviuscula	1	-	-	-
Drusilla canaliculata	-	-	-	1
Ocypus olens	-	-	-	1
Othius melanocephalus	1	-	-	-
Oxypoda opaca	-	1	-	-
Quedius molochinus	1	-	-	-
Quedius semiobscurus	-	1	-	-
Rugilus erichsoni	-	-	-	1
Staphylinus dimidiaticornis	1	-	-	2
Stenus nanus	-	-	1	-
Tachinus marginellus	-	2	-	-
Tachyporus chrysomelinus	-	1	-	-
Tachyporus pusillus	-	-	1	-

TABLE 7. Staphylinid beetles recorded from restored mine-spoil grasslands near As Pontes de Garcia Rodriquez (Galicia). S-vac = Stihl vacuum suction sampler; Traps = pitfall traps.

Species	***Slope***			***Holcus/Trifolium***			***Cytisus/Ulex***		
	S-vac	*Traps*	*Total*	*S-vac*	*Traps*	*Total*	*S-vac*	*Traps*	*Total*
Atheta amplicollis	31	2	**33**	23	3	**26**	41	14	**55**
Atheta fungi	4	-	**4**	1	-	**1**	48	28	**76**
Atheta orbata	-	-	-	-	-	-	10	2	**12**
Sepedophilus nigripennis	5	-	**5**	1	-	**1**	59	2	**61**
Stenus impressus	13	-	**13**	6	-	**6**	130	-	**130**
Stenus ossium	39	-	**39**	4	-	**4**	45	-	**45**
Tachyporus solutus	-	-	-	-	-	-	9	1	**10**
Amischa analis	1	-	**1**	7	2	**9**	-	-	-
Philonthus carbonarius	-	-	-	3	-	**3**	-	-	-
Quedius boops	2	-	**2**	1	-	**1**	6	2	**8**
Quedius nitipennis	2	1	**3**	-	-	-	-	-	-
Stenus fulvicornis	4	-	**4**	-	-	-	-	-	-
Tachyporus dispar	3	-	**3**	1	-	**1**	-	1	**1**
Xantholinus longiventris	-	9	**9**	2	1	**3**	1	1	**2**
Acrotona muscorum	-	-	-	-	-	-	1	-	**1**
Ischnosoma longicorne	-	-	-	-	-	-	1	-	**1**
Ischnosoma splendidum	-	-	-	-	-	-	1	1	**2**
Nazeris ibericus	-	-	-	-	-	-	1	-	**1**
Oxypoda haemorrhoa	-	-	-	1	-	**1**	-	-	-
Paederus caligatus	-	-	-	1	-	**1**	-	-	-
Quedius fumatus	-	1	**1**	-	-	-	-	-	-
Quedius semiobscurus	-	-	-	1	-	**1**	-	-	-
Rugilus erichsoni	-	1	**1**	-	-	-	-	-	-
Sepedophilus lusitanicus	-	-	-	-	-	-	-	1	**1**
Stenus assequens	-	-	-	1	-	**1**	-	-	-
Stenus brunnipes	-	-	-	1	-	**1**	-	-	-
Stenus juno	1	-	**1**	-	-	-	-	-	-
Stenus ludyi	-	-	-	-	-	-	1	-	**1**
Sunius propinquus	1	-	**2**	-	-	-	1	-	**1**
Tachinus rufipes	-	2	**2**	-	-	-	-	-	-
Tachyporus chrysomelinus	-	-	-	1	-	**1**	-	-	-

TABLE 8. Staphylinid beetles recorded from: restored grasslands and an old meadow near As Pontes de Garcia Rodriquez (Galicia) (see Table 1); from unburnt fixed sand dunes at Castlefreke (Co. Cork) ('Cfreke'); and from rough grassland at Cape Clear Island (Co. Cork) ('CClear'). 'Manur' = manured field; 'Herb' = herb-rich old meadow; 'S + T' = suction sampler + pitfall traps.

Species	***Clay***	***Pinus***	***Manur***	***Alnus***	***Herb***	***Cfreke***	***CClear***	
	S + T	*S + T*	*S + T*	*S + T*	*S + T*	*D-vac*	*D-vac 1*	*D-vac 2*
Atheta amplicollis	-	11	38	32	5	1	2	-
Atheta fungi	-	2	24	18	1	2	-	-
Sepedophilus nigripennis	21	8	2	19	-	45	20	67
Stenus impressus	35	45	54	71	2	36	1	20
Stenus ossium	76	11	65	8	-	12	7	2
Stenus similis	-	-	-	-	12	-	-	-
Tachyporus dispar	3	4	2	5	8	7	12	7
Tachyporus nitidulus	2	-	2	-	-	4	11	-
Amischa analis	-	3	1	-	2	-	1	-
Atheta orbata	1	-	3	-	1	-	-	-
Heterothops dissimilis	-	-	-	-	4	-	-	-
Philonthus carbonarius	-	-	4	-	-	-	-	-
Quedius boops	6	4	3	2	-	-	-	-
Stenus flavipes	-	-	-	-	8	-	-	-
Stenus fulvicornis	-	-	1	1	6	-	1	1
Tachyporus chrysomelinus	-	-	5	-	-	-	1	1
Tachyporus solutus	-	-	4	3	2	-	1	1
Xantholinus longiventris	-	9	6	3	-	-	-	-
Amischa decipiens	-	-	1	-	-	-	-	-
Astenus gracilis	-	-	-	-	2	-	-	-
Astenus lyonessius	-	-	-	-	-	-	1	-
Cypha laeviuscula	-	-	-	-	-	1	-	-
Gabrius sp. (♀)	-	-	-	1	-	-	-	-
Ischnosoma longicorne	-	-	-	1	-	-	-	-
Metopsia clypeata	-	-	1	-	-	-	-	-
Micropeplus staphylinoides	2	-	-	-	-	-	-	-
Ocypus aeneocephalus	-	-	-	-	1	-	-	-
Oligota inflata	-	-	1	-	-	1	-	-
Paederus caligatus	-	-	-	1	-	-	-	-
Philonthus cognatus	-	-	2	-	1	-	-	-
Quedius molochinus	-	-	1	-	-	-	-	-
Quedius semiobscurus	1	-	1	-	-	-	-	-
Rugilus geniculatus	-	-	-	-	1	-	-	-
Sepedophilus lusitanicus	1	-	-	-	-	-	-	-
Stenus assequens	-	-	-	-	1	-	-	-
Stenus brunnipes	-	1	-	-	1	-	-	-
Stenus clavicornis	-	-	-	-	-	-	-	1
Stenus ludyi	-	2	-	-	-	-	-	-
Stenus melanarius	-	-	1	-	-	-	-	-
Stenus providus	-	-	-	-	1	-	-	-
Tachyporus hypnorum	-	-	-	-	1	-	-	-
Tachyporus pusillus	-	-	1	-	-	-	-	-
Tachyporus tersus	-	-	-	-	2	-	-	-

TABLE 9. Staphylinidae recorded from pitfall traps in turlough pastures in south-east Galway: (Blackrock and Lydacan turloughs), and from winter sod samples from sand dune pasture in west Clare (Doonbeg dunes).

Species	***Blackrock***	***Lydacan***	***Doonbeg***
Amischa analis	9	-	14
Atheta amplicollis	5	4	14
Atheta fungi	15	1	-
Ischnosoma splendidum	-	-	15
Philonthus carbonarius	1	1	10
Philonthus cognatus	29	13	10
Gabrius breviventer	3	10	3
Tachinus rufipes	-	11	-
Aloconota gregaria	8	3	-
Anotylus rugosus	8	2	1
Atheta graminicola	-	6	-
Carpelimus manchuricus	3	6	-
Geostiba circellaris	-	-	8
Gyrohypnus angustatus	-	-	3
Ochthephilum fracticorne	-	-	3
Philonthus laminatus	-	5	2
Philonthus quisquiliarius	-	3	-
Philonthus varians	-	-	5
Platystethus nodifrons	5	6	-
Quedius semiobscurus	-	-	5
Rugilus erichsoni	-	-	6
Stenus boops	-	6	-
Stenus fuscipes	2	5	-
Tachyporus dispar	2	3	7
Tachyporus nitidulus	9	1	-
Xantholinus linearis	-	-	6
Amischa decipiens	1	1	-
Calodera aethiops	-	1	-
Calodera nigrita	-	1	-
Hygropora cunctans	-	1	-
Lathrobium geminum	-	-	1
Lathrobium quadratum	-	2	-
Micropeplus porcatus	2	-	-
Othius punctulatus	-	-	1
Oxypoda brevicornis	-	2	-
Oxytelus laqueatus	-	1	-
Atheta malleus	-	2	-
Atheta melanocera	-	2	-
Philonthus micans	1	-	-
Philonthus punctus	-	1	-
Platystethus arenarius	-	2	-
Rugilus rufipes	-	-	1
Stenus nanus	1	-	-
Stenus melanopus	1	-	-
Stenus similis	1	-	-

TABLE 9 (continued).

Species	***Blackrock***	***Lydacan***	***Doonbeg***
Tachyporus atriceps	-	-	2
Tachyporus chrysomelinus	2	-	-
Tachyporus pusillus	2	2	-
Tachyporus tersus	-	-	2

TABLE 10. Staphylinid beetles recorded from: *Sesleria caerulea* grassland at Skehanagh (Co. Tipperary) ('Traps' = pitfall traps); Castlefreke ('Cfreke') (Co. Cork) short-turf fixed sand dunes (recovering from burning); Clorhane (Co. Offaly) limestone outcrop pasture.

Species	***Skehanagh***				***Cfreke***	***Clorhane***
	S-vac	*Traps1*	*Total*	*Traps2*	*D-vac*	*Traps*
Drusilla canaliculata	-	6	**6**	-	6	10
Falagrioma thoracica	-	-	**-**	-	12	-
Micropeplus staphylinoides	-	-	**-**	-	-	20
Staphylinus dimidiaticornis	-	-	**-**	16	-	1
Tachyporus chrysomelinus	17	-	**17**	-	-	-
Amischa analis	-	2	**2**	1	-	-
Astenus lyonessius	-	-	**-**	-	4	-
Atheta amplicollis	2	-	**2**	-	-	5
Carpelimus elongatulus	-	4	**4**	1	-	-
Geostiba circellaris	-	3	**3**	-	-	-
Metopsia clypeata	-	-	**-**	-	-	5
Ocypus olens	-	-	**-**	-	-	5
Pella limbata	-	7	**7**	2	-	-
Sepedophilus nigripennis	-	-	**-**	1	4	1
Stenus clavicornis	-	-	**-**	-	3	2
Stenus flavipes	5	-	**5**	-	-	-
Stenus impressus	8	-	**8**	-	-	1
Tachinus rufipes	-	-	**-**	-	-	3
Tachyporus dispar	3	-	**3**	-	4	-
Tachyporus hypnorum	3	-	**3**	-	-	-
Tachyporus nitidulus	7	1	**8**	-	-	-
Amischa nigrofusca	2	-	**2**	-	-	-
Anotylus rugosus	-	1	**1**	1	-	-
Anthobium unicolor	-	-	**-**	-	-	1
Lamprinodes saginatus	-	1	**1**	-	-	-
Lesteva sicula heeri	-	1	**1**	-	-	-
Liogluta microptera	-	2	**2**	-	-	-
Myllaena infuscata	1	-	**1**	-	-	-
Philonthus longicornis	-	1	**1**	-	-	-
Quedius humeralis	-	1	**1**	-	-	-
Rugilus erichsoni	-	-	**-**	-	-	2
Stenus latifrons	-	1	**1**	-	-	-
Stenus ossium	1	-	**1**	-	2	-
Tachyporus obtusus	1	-	**1**	-	-	-
Tachyporus pusillus	-	-	**-**	-	1	-

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SOME RECORDS OF ADULT STONEFLIES (PLECOPTERA), INCLUDING OBSERVATIONS ON WING LENGTH, FROM IRELAND, 2018-2020

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Abstract

Adult distribution records for 14 species of stoneflies (Plecoptera) collected between May 2018 and October 2020 are provided. Records of brachyptery and microptery are also provided, where relevant. One notable record included is that of an adult female *Perla bipunctata* which is the earliest confirmed for Irish populations to date.

Key words: Plecoptera, stonefly, distribution, wing length, brachyptery, microptery.

Introduction

In recent years there have been several reviews of stoneflies in Ireland with the most recent by Feeley, Baars and Kelly-Quinn (2016) and Feeley *et al.* (2020). The former publication provided an update of species distributions using 10km maps and provided an extensive review of available ecological information for each species. In contrast, Feeley *et al.* (2020) updated the information on the number, and chronological distribution, of records available for Irish stoneflies covering the period from early 1900s up to, and including, 2018 and also provided an assessment of the International Union for the Conservation of Nature status for each species. Feeley *et al*. (2020) also provided an update on nomenclature and confirmed the regional extinction of *Perlodes mortoni* (Klapálek, 1906) in Ireland. The island now has 19 extant and verified species.

Between May 2018 and October 2020, the authors have collected additional adult stoneflies from many parts of the country while on fieldwork. Some additional records submitted to HBF for verification are also included. The adults were identified using Hynes (1977) and the data are presented here. The nomenclature follows Feeley *et al.* (2020). All adults were fully winged (i.e. macropterous) unless otherwise stated. A small number of individuals were difficult to identify definitively. These specimens were sent to Craig R. Macadam (Buglife, U.K.) for confirmation.

One notable record relates to that of an adult female *Perla bipunctata* Pictet, 1833, recorded on 9 May 2020 along a small inflow of Lough Na Fooey, County Mayo. While the record is within the noted period of emergence by Hynes (1977), this is the earliest recorded adult the authors can confirm for Irish populations. Previously, adult *P. bipunctata* have only been recorded in late May and early June (Costello, McCarthy and O'Farrell, 1984; Feeley, Baars and Kelly-Quinn, 2009; Feeley and Kelly-Quinn, 2016, and see similar records below). Additionally, this species tends to exhibit protandrous emergence (Feeley and Kelly-Quinn, 2016) which could suggest a male emergence in late April, but this remains unconfirmed.

All records will be forwarded to the National Biodiversity Data Centre in Addendum 3 to the dataset "Stoneflies (Plecoptera) of Ireland" (Feeley, 2020) and to the Centre for Environmental Data and Recording (Belfast) (last updated 4 February 2020 after Feeley *et al.*, 2020). The following abbreviations are used in the text: HBF = Hugh B. Feeley and JRB = Jan-Robert Baars.

Family CHLOROPERLIDAE

***Chloroperla tripunctata* (Scopoli, 1763)**

WEXFORD: River Bann, Pallis Bridge (T1168), 1♀ 18 June 2020, HBF.

***Siphonoperla torrentium* (Pictet, 1841)**

CARLOW: Pollmounty River, downstream Aughananagh River confluence (S7435), 1♀ 30 June 2020, HBF.

KILDARE: Hartwell Stream, bridge south of Kill (N9321), 2♀♀ 25 June 2020, JRB.

KILKENNY: Gowran River, bridge east of Freneystown (S5960), 1♀ 23 June 2020, HBF.

LAOIS: Crooked River (Stradbally), Timoge Bridge (west of Ballinteskin) (S5593), 1♀ 15 June 2020; River Barrow, Tinnahinch Bridge (N3510), 2♀♀ 8 June 2020; River Douglas, Gale's Bridge (S6585), 1♀ 16 June 2020; Stradbally River, bridge north-west of Ballintlea (S5389), 2♀♀2♂♂ 15 June 2020, all HBF.

WEXFORD: Aughnacrew River, bridge just upstream of the Pollmounty River confluence (S7634), 1♀ 30 June 2020; Lask River, bridge north-west of Craanford (T0762), 6♀♀ 17 June 2020; River Bann, bridge at Hollyfort (T1264), 4♀♀ 18 June 2020; River Boro, Ballymackesy Bridge (S8935), 1♀ 30 June 2020, all HBF.

WICKLOW: Cock Brook, bridge north-west of Kilmore (O0208), 1♂ 24 April 2020; Glashaboy Brook, Glashaboy Bridge (O0601), 1♂ 24 April 2020; River Derry, Balisland Bridge (T9764), 1♀5♂♂ 15 July 2020; River Slaney, Tuckmill Bridge (S8791), 2♀♀ 26 June 2020, all HBF.

Family LEUCTRIDAE

***Leuctra fusca* (Linnaeus, 1758)**

KILDARE: River Liffey, bridge in Kilcullen (N8049), 1♂ 13 September 2020; Rye Water River, Rye Bridge, Kilcock (N8840), 2♀♀1♂ 17 September 2020; Wheatfield Stream, a tributary of the River Liffey, north of Ardclough (N9530), 1♀ 18 September 2020, all JRB.

TIPPERARY: River Suir, Cahir Park (S0522), 1♀1♂ 10 October 2020; River Suir, Thonoge River confluence (S0620), 1♀1♂ 11 October 2020, all Larry Doherty.

***Leuctra hippopus* Kempny, 1899**

GALWAY: Ardderry Lough (L9845), 2♀♀1♂ 21 August 2019; Ballyquirke Lough (M2330), 1♀ 22 August 2019, all HBF.

KILDARE: Hartwell Stream, bridge south of Kill (N9321), 1♀ 25 June 2020, JRB.

WICKLOW: Annalecka Brook, Annalecka Bridge (O0501), 10♀♀5♂♂ 24 April 2020; Avonmore River, bridge south-east of the Sally Gap (O1409), 2♀♀1♂ 28 April 2020; Ballinagee River, Ballinagee Bridge (O0302), 1♀2♂♂ 24 April 2020; Ballylow Brook, bridge upstream of the Ballydonnell Brook confluence (O0613), 1♀ 28 April 2020; Cock Brook, bridge north-west of Kilmore (O0208), 16♀♀8♂♂ 9 April 2019, & 2♀♀8♂♂ 24 April 2020; Glashaboy Brook, Glashaboy Bridge (O0601), 1♀ 24 April 2020; Glashboy Brook, tributary near Glashboy Bridge (T0601), 2♀♀2♂♂ 24 April 2020; Glenealo River, ford upstream of the Upper Lake (T0996), 1♀ 27 April 2020; Kings (Liffey) River, bridge 100m upstream of the Ballinagee River confluence (O0302), 1♀1♂ 24 April 2020; River Liffey, 2km north-west of the Sally Gap (O1112), 1♀ 28 April 2020; River Liffey, bridge east of Ballysmuttan (O0514), 1♀ 28 April 2020, all HBF.

***Leuctra inermis* Kempny, 1899**

WICKLOW: Annalecka Brook, Annalecka Bridge (O0501), 1♂ 24 April 2020; Avonmore River, bridge south-east of the Sally Gap (O1409), 1♀ 28 April 2020; Ballylow Brook, bridge upstream of the Ballydonnell Brook confluence (O0613), 1♂ 28 April 2020; Glashboy Brook, tributary near Glashboy Bridge (T0601), 2♀♀ 24 April 2020; River Liffey, 2km north-west of the Sally Gap (O1112), 1♂ 28 April 2020, all HBF.

Family NEMOURIDAE

***Amphinemura sulcicollis* (Stephens, 1836)**

LAOIS: Glenlahan River, Clarahill Bridge (N3410), 1♀ 8 June 2020, HBF.

***Nemoura avicularis* Morton, 1894**

WICKLOW: Lough Dan, Scout Centre (south-east of the pier) (O1503), 5♂♂ 27 April 2020, HBF.

It is interesting to note that Lough Dan is one of the two lakes where *Nemoura avicularis* was first discovered in Ireland (O'Connor and Bracken, 1980), the other being Lough Sillan, County Cavan.

***Nemoura cinerea* (Retzius, 1783)**

WICKLOW: Lough Dan, Scout Centre (south-east of the pier) (O1503), 2♀♀ 27 April 2020, HBF.

***Protonemura meyeri* (Pictet, 1841)**

KILKENNY: Gowran River, bridge east of Freneystown (S5960), 1♂ 23 June 2020, HBF.

WEXFORD: Lask River, Craanford (T0960), 1♀ 6 April 2019, HBF.

WICKLOW: River Liffey, 2km north-west of the Sally Gap (O1112), 1♀5♂♂ 28 April 2020; Ballinagee River, Ballinagee Bridge (O0302), 2♀♀2♂♂ 24 April 2020; Ballydonnell Brook, Ballylow Bridge (O0613), 2♀♀ 28 April 2020; Ballylow Brook, bridge upstream of Ballydonnell Brook confluence (O0613), 1♂ 28 April 2020; Cloghoge Brook, bridge upstream of Avonmore River confluence (O1506), 1♀ 4 April 2019; Cock Brook, bridge north-west of Kilmore (O0208), 1♀5♂♂ 9 April 2019; Glendasan River, bridge near old Lead Works (T0998), 1♂ 27 April 2020; Glenealo River, ford upstream of the Upper Lake (T0996), 1♀ 27 April 2020; Glashaboy Brook, Glashaboy Bridge (O0601), 1♂ 24 April 2020; Kings (Liffey) River, bridge 100m upstream of the Ballinagee River confluence (O0302), 1♀3♂♂ 3 April 2019 & 11♀ 24 April 2020; River Avonbeg, Drumgoff Bridge (T1090), 1♀ 23 April 2020; River Avonbeg, ford near Barravore (T0694), 1♂ 2 April 2019; River Avonbeg, Greenan Bridge (T1487), 3♀♀1♂ 23 April 2020; River Ow, bridge near Aghavannagh (T0586), 2♀♀1♂ 23 April 2020, all HBF.

Family PERLIDAE

***Dinocras cephalotes* (Curtis, 1827)**

CLARE: Annacarriga River, 6km north-west of Ballina (R6677), 14♀♀ (macropterous) 16♂♂ (brachypterous) 28 May 2018 & 2♀♀ (macropterous) 1♂ (brachypterous) 9 June 2020; Caher River, bridge between Fermoyle and Craggeagh, east of Fanore (M1706), 30♀♀ (macropterous) 54♂♂ (brachypterous) 28 May 2018 & 33♀♀ (macropterous) 18♂♂ (brachypterous) 9 June 2020; tributary of Broadford River, Kilbane west of Killaloe (R6272), 8♀♀ (macropterous) 5♂♂ (brachypterous) 28 May 2018, all JRB.

OFFALY: Camcor River, bridge north-west of Kinnitty (N1706), 1♀ 28 May 2018, JRB.

***Perla bipunctata* Pictet, 1833**

CLARE: tributary of Broadford River, Kilbane west of Killaloe (R6272), 1♀ 9 June 2020, JRB.

GALWAY: River near Currarevagh, draining Ben Beg on the south side of Lough Na Fooey (500m south-east of the Fooey River inflow) (L9559), 1♀ 9 May 2020, Úna Donoghue.

OFFALY: Camcor River, bridge north-west of Kinnitty (N1706), 4♀♀ (macropterous) 5♂♂ (brachypterous) 28 May 2018 & 2♀♀ (macropterous) 1♂ (brachypterous) 9 June 2020, Camcor River, bridge south-west of Kinnitty near Forelacka (N2104), 1♀ 9 June 2020, all JRB.

Family PERLODIDAE

***Diura bicaudata* (Linnaeus, 1758)**

MAYO: Lough Mask, on small headland after the first bay south-east (~700m) of Cloon River inflow (M1371), 1♀ (brachypterous) 1♂ (micropterous) 23 July 2020, Brian Nelson.

WICKLOW: Annalecka Brook, Annalecka Bridge (O0501), 1♀ 24 April 2020; Avonmore River, bridge south-east of the Sally Gap (O1409), 1♂ (micopterous) 28 April 2020; Cock Brook, bridge north-west of Kilmore (O0208), 2♀♀ 24 April 2020; Lugduff Brook, just downstream of the bridge, Pollanass (T1196), 2♂♂ (micopterous) 27 April 2020; River Liffey, 2km north-west of the Sally Gap (O1112), 1♀ 9 April 2019 & 1♀ 28 April 2020; River Ow, Ballymanus Bridge (T0981), 1♂ (micopterous) 23 April 2020, all HBF.

***Isoperla grammatica* (Poda, 1761)**

CARLOW: Ballyroughan Little Steam, bridge south-west of Ballyroughan Little (S7346), 2♀♀1♂ 29 June 2020; Pollmounty River, downstream of Aughananagh River confluence (S7435), 1♀ 30 June 2020, all HBF.

KILDARE: Hartwell Stream, bridge south of Kill (N9321), 1♀2♂♂ 25 June 2020, JRB.

LAOIS: Glenlahan River, Clarahill Bridge (N3410), 2♂♂ 8 June 2020; Owenass River, bridge north of Irishtown House (Mountmellick) on the N80 (N4507), 4♂♂ 9 June 2020; Stradbally River, Bauteoge Bridge (S5593), 2♀♀ 15 June 2020, all HBF.

OFFALY: Camcor River, bridge north-west of Kinnitty (N1706), 2♀♀ 9 June 2020, JRB.

WEXFORD: River Bann, Pallis Bridge (T1168), 2♀♀ 18 June 2020; Lask River, bridge north-west of Craanford (T0762), 2♀♀ 17 June 2020, all HBF.

WICKLOW: River Slaney, Tuckmill Bridge (S8791), 2♂♂ 26 June 2020, HBF.

Family TAENIOPTERYGIDAE

***Brachyptera risi* (Morton, 1896)**

MAYO: small inflow near Callow Lake Upper (G3103), 1? 5 April 2020, Bryan Kennedy (genitalia not visible, species confirmed using wing venation by HBF).

KILKENNY: Ballinaboley, Kilmacow (S5320), 1♀ 24 March 2020, Adrian Allen.

WICKLOW: Annalecka Brook, Annalecka Bridge (O0501), 1♂ 24 April 2020; Ballinagee River, Ballinagee Bridge (O0302), 2♀♀2♂♂ 24 April 2020; Ballylow Brook, bridge upstream of Ballydonnell Brook confluence (O0613), 1♀ 28 April 2020; Cock Brook, bridge north-west of Kilmore (O0208), 3♀♀3♂♂ 9 April 2019 & 2♀♀1♂ 24 April 2020; Glashaboy Brook,

Glashaboy Bridge (O0601), 1♂ 24 April 2020; Glendasan River, bridge near old lead works (T0998), 1♀1♂ 27 April 2020; Kings (Liffey) River, bridge north-west of Lockstown Upper (N9703), 1♂ 24 April 2020; River Avonbeg, Drumgoff Bridge (T1090), 2♀♀ 23 April 2020; River Liffey, bridge east of Ballysmuttan (O0514), 2♂♂ 28 April 2020, all HBF.

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BRAZIL NUTS *BERTHOLLETIA EXCELSA* HUMBOLT & BONPLAND (LECYTHIDACEAE) STRANDED ON IRISH, NW EUROPEAN AND WESTERN NORTH ATLANTIC MARITIME SHORES

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Abstract

Although stranded Brazil Nuts *Bertholletia excelsa* have occasionally been recorded from Irish, NW European, and western North Atlantic maritime shores, they are generally regarded as local refuse. During the early 1990s, four specimens of stranded Brazil Nuts were discovered on Irish maritime shores, and two more in Cornwall, U.K. during 2014. The occurrence and potential provenance of stranded Brazil Nuts on Irish, NW European, and western North Atlantic maritime shores is reviewed. It is possible that at least some of the NW European specimens may represent true trans-Atlantic peregrine drifters.

Key words: Brazil Nut, *Bertholletia excelsa*, stranded, Ireland, NW Europe, North Atlantic.

Introduction

Although the Brazil Nut *Bertholletia excelsa* Humbolt & Bonpland belongs to a large pantropical family of trees (Lecythidaceae) that includes approximately 234 species in the Neotropics, it is the only species within the monotypic genus *Bertholletia* (Mori and Prance, 1990; Huang *et al*., 2015; Cabral *et al*., 2017; Thomson *et al*., 2018).

B. excelsa is an exceptionally large, slow-growing, late-maturing, and long-lived pioneering canopy tree, which reaches a height of up to 60m, attains reproductive maturity at >120 years of age, and may survive for up to 1600 years. (Mori and Prance, 1990; Peres and Baider, 1997; Zuidema *et al*., 2002; Shepard and Ramirez, 2010; Thomas *et al*., 2014).

B. excelsa is native to Bolivia, Brazil, Columbia, Guiana, Peru, Surinam and Venezuela, where it is considered to be a light-dependent gap specialist, growing in widely scattered stands of 50-100 individuals (colloquially known as "manchales", "castanales" and "castanhais") on well-drained non-flooded (*terra firme*) nutrient-poor oxysol and utisol soils in lowland rainforests within hydrometric catchments of the Amazon, Orinoco, Rio Negro and Tapajos Rivers (Van Roosmalen, 1985; Mori and Prance, 1990; Peres and Baider, 1997). Brazil Nuts

have been introduced to Cuba, Trinidad, West Africa (Côte d'Ivoire, Gambia, Ghana, Morocco), and Malaysia where they are cultivated, albeit apparently with different levels of commercial success (Mori and Prance, 1990; Anon, 2019).

Although stranded Brazil Nuts have occasionally been recorded from Irish, NW European, and western North Atlantic maritime shores, they are generally regarded as local refuse (Nelson, 1978, 1990, 2000; Cadée, 1997; Brochard and Cadée, 2005). However, the current review considers the possibility that at least some of the NW European records may have been true trans-Atlantic peregrine drifters.

Ecology of *Bertholletia excelsa*

The Brazil Nut fruit is unique among the Lecythidaceae in that the seeds remain encased after the fruit fall. The large dark brown mesocarp is an extremely hard, globose, woody capsule (pyxidium), measuring up to 150mm in diameter and weighing up to 2.2kg, which drops to the ground after a maturation period of *c.*15 months. The pyxidium is functionally indehiscent, and the mature seeds (7-29 per fruit), remain trapped inside the thick pericarps of fruits on the ground unless opened by a vertebrate seed predator, particularly by scatter-hoarding cavimorph rodents such as Agoutis *Dasyprocta* sp. and Acouchis *Myoprocta* sp., which are capable of gnawing through the thick pericarp wall of newly fallen fruits to access the seeds inside. The Brazil Nut tree therefore relies almost entirely on these mutualistic large terrestrial rodents for the natural release and dispersal of their well-protected seeds (Van Roosmalen, 1985; Mori and Prance, 1990; Peres and Baider, 1997; Tuck Haugaasen *et al.*, 2010). Native Amerindians have exploited Brazil Nuts since at least *c.*11, 000 BP, and may have contributed to the geographical dispersal of *B. excelsa*, particularly in central and eastern Amazonia (Shepard and Ramirez, 2011; Thomas *et al.*, 2014, 2015).

Brazil Nut seeds measuring up to 50mm in length and 25mm in width, are triangular in cross-section (triquetrous), finely transversely ribbed (costate), with three longitudinal furrows. The external hard lignified testa (shell) protects a large embryo measuring on average 40mm in length, 20mm in width, and weighing up to 6.7g. The edible embryo is highly attractive to seed predators and contains 17-25% protein and 70-72% lipids (Van Roosmalen, 1985; Mori and Prance, 1990; Peres and Baider, 1997; Tuck Haugaasen *et al.*, 2010; Sonego *et al.*, 2019.

Commercial harvesting of Brazil Nuts (*Bertholletia excelsa*)

Brazil Nuts were first introduced to Europe by Dutch traders during the late 18th century with trade increasing greatly during the late 19th century. The nuts now represent Amazonia's most socio-economically important non-timber forest product, and the only globally-traded seed crop predominantly collected from natural forests (Mori and Prance, 1990; Shepard and Ramirez,

2011). During 2018, the total global volume of unshelled Brazil Nuts was 94,437 tonnes, produced by four countries: Brazil (39.1%), Bolivia (32.9%), Côte d'Ivoire (21.4%) and Peru (6.6%) (Anon., 2019).

After the fruits are collected, they are split open with a machete or an axe and the seeds are removed. The seeds are placed in water to clean them of mud and to determine which are bad. Seeds that sink are classified as good while those that float to the surface are culled out. Due to their high polyunsaturated fat content (32%), primarily omega-6 fatty acids, shelled Brazil Nuts may quickly become rancid and are extremely susceptible to fungal attack (De Almeida, 1963; De Souza, 1963; Mori and Prance, 1990).

Brazil Nuts (*Bertholletia excelsa*) stranded on Irish and NW European maritime shores

On 16 June 1990, DM discovered an intact Brazil Nut measuring 41mm in length and 26mm in diameter stranded on Tramore Beach (52.1585 °N, 7.1444 °W), County Waterford, on the SE coast of Ireland. On 14 May 1991, DM discovered a damaged Brazil Nut measuring 39mm in length and 25mm in diameter, along with a specimen of the tropical Horse-Eye Bean *Mucuna sloanei* Fawcett & Rendle, 1917 stranded on Ballydonegan Beach (51.6323 °N, 10.0583 °W), Allihies, County Cork, on the SW coast of Ireland. Two more stranded specimens were discovered by DM at unknown locations on the Irish coast during 1990-1991 (Plate 1). The specimens, which represent the first published records of stranded *Bertholletia excelsa* seeds from Irish waters, were donated to the National Herbarium, Dublin (DBN: 2020).

Details of all known records of Brazil Nuts stranded on NW European maritime shores are summarized in Table 1, including at least 29 from Ireland, 7 from the UK, and 3 from the Netherlands. During the early 1960s, hundreds of Brazil Nuts were reported from various beaches on the Dingle Peninsula, County Kerry, on the south-west coast of Ireland (Nelson, 1986, 1990, 2000). Based on the maximum known flotation ability of Brazil Nuts at that time (3 months), Nelson (1990) concluded that these nuts were clearly the result of cargo-loss from a ship. The U.K. specimens included 4 recorded from the Isle of Barra (Outer Hebrides), on west coast Scotland during the early 1900s (Nelson, 1986, 1990, 2000), one from Wales (Cardigan Bay) prior to 1998 (Chater, 1998), and 2 from Cornwall during 2014 (Plate 2). Chater (1998) considered that the Welsh specimen was refuse of human origin. Apart from one specimen recorded at Zandvoort (Holland) during 2002 (Anon., 2003), Brochard and Cadée (2005) remarked that specimens were regularly washed up on the Island of Texel. Cadée (1997) considered that the Dutch specimens were probably locally discarded.

In 1998, the European Community (EC) enacted a regulation (Regulation 1525-98 EC; Anon., 1998) reducing the maximum acceptable level of aflatoxins, carcinogenic chemicals produced by moulds that grow on protein-rich foods such as Brazil Nuts, from 20 ppb to 4 ppb.

This regulation appears to have resulted in a major reduction in the quantity of whole in-shell Brazil Nuts subsequently imported into EU countries (Newing and Harrop, 2000; Anon., 2005). Whole in-shell Brazil Nuts were traditionally regarded as a favourite nut-cracker's fare, particularly at Halloween (31 October), but they now appear to be a rarity. Indeed, during the month running up to Halloween 2020, DQ failed to find any whole in-shell Brazil Nuts on sale in several major supermarkets, specialist fruit and vegetable shops and ethnic stores in Counties Dublin and Wicklow. However, shelled Brazil Nuts were widely available in many retail outlets. It is possible that this EU regulation may also partly account for apparent paucity of stranded whole in-shell Brazil Nuts on NW European maritime shores since the late 1990s.

Brazil Nuts (*Bertholletia excelsa*) stranded on western North Atlantic maritime shores

Stranded Brazil Nuts have been reported on various beaches in the western North Atlantic (Gulf of Mexico) ranging from Mexico (Yucatan Peninsula), Texas (Padre Island) and the east coast of Florida (Gunn, 1968; Gunn and Dennis, 1973; Gunn *et al.*, 1984; Sullivan, 2003) Although Perry and Dennis (2010) considered that most of these nuts were probably left behind by local picnickers or were derived from shipping refuse, they suggested the possibility, based on subsequently recorded maximum flotation abilities of up to one year, that some nuts may have arrived by way of ocean currents from northern South America.

Discussion

The maximum recorded flotation ability of Brazil Nuts in seawater under test conditions (one year) would suggest that it is unlikely that they could drift across the Atlantic *via* the Gulf Stream and North Atlantic Drift and strand on NW European maritime shores within the estimated minimum time interval of 14 to 18 months for passively drifting objects (Quigley *et al.*, 2016).

However, it is possible, under certain conditions, that some nuts may remain afloat long enough to achieve a passive trans-Atlantic crossing. For example, long-term immersion in water (either fresh or seawater), particularly in anoxic benthic environments, is likely to lead to gradual bacterial decay of the endosperm and the release of gases which might result in some level of temporary buoyancy. Indeed, empty and/or partially empty Brazil Nuts (which float), are commercially sorted and discarded from whole nuts (which sink) on the basis of their flotation properties (De Almeida, 1963; De Souza, 1963; Müller, 1981; Mori, 1992; Martins *et al.*, 2018). It is possible that some of these commercially discarded 'floaters' are carried down Amazonian rivers into Caribbean Sea and continue floating in ocean currents until they eventually sink or strand on maritime shores, in some cases, perhaps many thousands of miles from where they were originally harvested and sorted.

It is interesting to note that after three decades in dry storage, three of the intact, albeit empty Brazil Nuts stranded on the Irish coast during 1990-91 remained afloat for at least two months in freshwater, whereas the damaged specimen immediately sank like a stone. Although both of the Cornish specimens collected during 2014 remained afloat during short-term seawater tests, longer-term flotation tests (>14 months) are required in order to determine if these NW European stranded nuts might represent true peregrine trans-Atlantic drifters.

The co-occurrence of stranded Brazil Nuts along with other tropical seeds suggests that these disseminules may have originated from the same general region in the western tropical Atlantic and probably arrived in NW Europe simultaneously. For example, the relatively large number of Brazil Nuts recorded on various beaches in County Kerry during 1965 coincided with the stranding of a Sea Purse *Dioclea reflexa* Hook. f. and Sea Heart *Entada gigas* (L.) Fawcett & Rendell in the same area (Nelson, 1986). During May 1991, a Horse-Eye Bean (*Mucuna sloanei*) was found stranded along with a Brazil Nut on Ballydonegan Beach, County Cork. *D. reflexa*, *E. entada*, and *M. sloanei* are endemic to tropical America and specimens stranded on NW European maritime shores are considered to be true long-distance drift-seeds (Nelson, 2000).

Although some of the Brazil Nuts stranded on NW European maritime shores may have been locally discarded or derived from lost ship cargo, perhaps others may represent true peregrine trans-Atlantic drifters, possibly commercial discards ('floaters') from the Amazonian region which currently accounts for almost 80% of global production.

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TABLE 1. NW European records of stranded Brazil Nuts *Bertholletia excelsa*.

Date	Location	Latitude	Longitude	TL (mm)	Width (mm)	Recorder	Voucher	Reference	Notes
early 1910s	West Sand, Eoligarry, Isle of Barra, Outer Hebrides, NW Scotland	57.0393	-7.4321			William L. MacGillivray	King's Museum, Aberdeen (ABDUZ: 500866.1)	Nelson (1986, 1999, 2000)	
early 1910s	West Sand, Eoligarry, Isle of Barra, Outer Hebrides, NW Scotland	57.0393	-7.4321			William L. MacGillivray	King's Museum, Aberdeen (ABDUZ: 500866.2)	Nelson (1986, 1999, 2000)	missing 26.11.1975 S.S.
early 1910s	Cliesil Shore, Isle of Barra, Outer Hebrides, NW Scotland	57.0119	-7.4904			William L. MacGillivray	King's Museum, Aberdeen (ABDUZ: 500866.3)	Nelson (1986, 1999, 2000)	
early 1910s	Isle of Barra, Outer Hebrides, NW Scotland	57.0393	-7.4321			William L. MacGillivray	Royal Scottish Museum (RSM)	Nelson (1986, 1999, 2000)	
1944	Slea Head, Co Kerry, SW Ireland	52.0464	-10.4592			Michael Long		Nelson (1986, 1999, 2000)	
24/03/1965	Slea Head, Co Kerry, SW Ireland	52.0464	-10.4592			Michael Long		Nelson (1986, 1999, 2000)	3 seeds
26/03/1965	Inch, Co Kerry, SW Ireland	52.1427	-9.9810			Michael Long		Nelson (1986, 1999, 2000)	17 seeds
02/05/1965	Ventry, Co Kerry, SW Ireland	52.1327	-10.3632			Michael Long		Nelson (1986, 1999, 2000)	
20/05/1965	Dingle, Co Kerry, SW Ireland	52.1408	-10.2800			Michael Long		Nelson (1986, 1999, 2000)	
20/05/1965	Kilmurl, Co Kerry, SW Ireland	52.1209	-10.2063			Michael Long		Nelson (1986, 1999, 2000)	
1966	Ventry, Co Kerry, SW Ireland	52.1327	-10.3632			Michael Long		Nelson (1986, 1999, 2000)	
06/06/1990	Tramore Beach, Co Waterford	52.1505	-7.1444	41	26	Dan Minchin	DBN 2020	This paper	
14/05/1991	Ballybunnegan Beach, Allihies, Co Cork	51.6323	-10.0533	39	25	Dan Minchin	DBN 2020	This paper	broken shell
1990-91	Irish coast			44	23	Dan Minchin	DBN 2020	This paper	
1990-91	Irish coast			39	22	Dan Minchin	DBN 2020	This paper	
prior to 1997	Dutch Coast							Cadée (1997)	refuse of human origin
prior to 1998	Cardigan Bay, Cardiganshire (VC46), Wales, UK	52.5000	-4.4167					Chater (1999)	refuse of human origin
08/11/2002	Zandvoort, Holland	52.3711	4.5334			Wim Kruiswijk		Anon (2003)	
prior to 2003	Texel, Holland	53.0546	4.7977					Brockerd & Cadée (2005)	regularly wash up on Texel
01/04/2014	Perranporth, N Cornwall, UK	50.349	5.1569	45	30	Tracey Williams		This paper	
01/04/2014	Perranporth, N Cornwall, UK	50.349	5.1569	40	31	Tracey Williams		This paper	

PLATE 1. Stranded Brazil Nuts (*Bertholletia excelsa*) from Irish waters. Photograph © Declan Quigley.

PLATE 2. Stranded Brazil Nuts (*Bertholletia excelsa*) from Cornwall, U.K. Photograph © Tracey Williams.

MORE RECORDS OF UNCOMMON IRISH BEETLES (COLEOPTERA), INCLUDING *CHILOTHORAX CONSPURCATUS* (LINNAEUS, 1758) (SCARABAEIDAE)

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Abstract

Records of uncommon and under recorded species of Irish beetles (Coleoptera) are presented, many relating to County Sligo. Fourteen beetle families are represented: Carabidae, Staphylinidae, Geotrupidae, Scarabaeidae, Dermestidae, Ptinidae, Cleridae, Nitidulidae, Cryptophagidae, Coccinellidae, Tenebrionidae, Cerambycidae, Chrysomelidae and Curculionidae. Johnson and Halbert (1902) listed *Chilothorax conspurcatus* (Linnaeus, 1758 as Irish based on a specimen in the National Museum of Ireland which had been in the collection of the 19th century entomologist James Tardy (1782-1835). The species was retained on the most recent Irish list (Anderson, Nash and O'Connor, 1997) but having studied the Tardy collection, Good (2013) rejected the record. The present record therefore confirms the presence of this distinctive dung beetle in Ireland.

Key words: Coleoptera, beetles, Ireland, uncommon species, under recorded species, new records, *Chilothorax conspurcatus* (Linnaeus, 1758) confirmed.

Introduction

Non-intensive collecting of beetles in County Sligo has resulted in the discovery of a number of uncommon and under recorded beetles. These finds are listed below, along with a few records from additional counties.

CARABIDAE

***Carabus glabratus* Paykull, 1790**

SLIGO: Copes Mountain (G742413), 1 June 2016, two specimens active on the mountain summit at *circa* 440m, with *Patrobus assimilis* Chaudoir also present. The only other record that I can trace for *Carabus glabratus* in the Dartry Range is that contained in Anon. (1901), and the species was unrecorded by McCormack, Nolan and Regan (2006) in their extensive survey of upland invertebrates in these parts.

***Syntomus foveatus* (Geoffroy in Fourcroy, 1785)**

WICKLOW: Arklow (T261747), 15 August 2017, frequent in grass cuttings at a coastal caravan part, and present also on nearby sandy ground.

STAPHYLINIDAE

***Micralymma marina* (Ström, 1783)**

SLIGO: Culleenamore (G609339), 28 May 2020, active on damp sand just below the high water mark. Accompanied by the carabid *Cillenus lateralis* Samouelle, with *Bembidion minimum* (Fabricius) and *Aepus marinus* (Ström) also present a short distance further up the shore. Both Halbert (1898) and Johnson (1913) note an association of these species with *Cillenus*.

***Deleaster dichrous* (Gravenhorst, 1802)**

DONEGAL: Tullan Strand (G827603), 12 June 2013.

SLIGO: Trawalua Strand (G697548), 26 April 2011. Colgagh Lake (G743364), 13 June 2011, singleton under a stone on a small patch of lake shore sand. Bartragh (G262290), 5 June 2013, scattered under pieces of wood on sand dune fore shore.

***Stenus geniculatus* Gravenhorst, 1806**

LEITRIM: Crocknagapple (G892445), 15 July 2015, male in moss at *circa* 320m.

SLIGO: Carrowkeel (G753117), 2 July 2015, a male sieved from mosses, collected under *Calluna* on a hilltop heath at *circa* 300m, with *Quedius nigriceps* Kraatz (1♂) also present. The latter specimen was damaged on collection.

***Ochthephilum fracticorne* (Paykull, 1800)**

SLIGO: Trawalua (G695543), 9 September 2014, a male under a piece of wood on bare sand in exposed sand dunes.

***Pseudomedon obsoletus* (Nordmann, 1837)**

SLIGO: Doonweelin (G649401), 17 April 2015, two females, sieved from a dung heap, in an abandoned quarry and bordering a *Phragmitis* stand. A very diverse beetle fauna was present, many species of which were beyond my identification skills but included the rove beetles *Platystethus arenarius* (Fourcroy), *Philonothus tenuicornis* Mulsant and Rey, *Quedius cinctus* (Paykull) and *Dinothenarus pubescens* (De Geer). I revisited the site on 15 June 2015. The dung heap, unchanged from April, proved almost lifeless but I did collect *Philonthus debilis* (Gravenhorst). The few other Irish records for *P. obsoletus* are summarised by Anderson and Bryan (2012).

***Othius laeviusculus* Stephens, 1833**

SLIGO: Barnaderg (G672477), 14 May 2015, a single male sieved from *Sphagnum* in a small patch of remnant blanket bog.

***Cafius fucicola* Curtis, 1830**

SLIGO: Killaspugbrone (G612372), 1 June 2020, a singleton under dry seaweed on a sandy foreshore. The few Irish records for *Cafius fucicola* include one from County Galway (Halbert 1895).

***Gabrius subnigritulus* (Reitter, 1909)**

= ***Gabrius appendiculatus* Sharp, 1910**

SLIGO: Dunmoran Strand (G525351), 10 February 2015, a single male sieved from moss on exposed sand dunes. Rathcarrick (G625353), 7 May 2020, a male on a paling post at the edge of rough grassland. A species, seemingly, with few Irish records (Anderson, 1997).

***Gabrius trossulus* (Nordmann, 1837)**

SLIGO: Donagh, (G443354), 5 February 2015, a single male taken with a male of *Philonthus albipes* (see below) in moss on an exposed coastal headland.

***Philonthus albipes* (Gravenhorst, 1802)**

SLIGO: Donagh, (G443354), 5 February 2015, a single male taken with a male of *Gabrius trossulus* (see above) in moss on an exposed coastal headland.

Philonthus albipes is described as being rare in Ireland by Anderson (2010), however there are a number of recent records.

***Philonthus succicola* Thomson, 1860**

SLIGO: Carns (G707341), 1 May 2020, a male in a jam-jar trap, baited with a dead field mouse and placed in mixed woodland. *Sciodrepoides watsoni* (Spence) (Leiodidae) was also present. A second male of *S. succicola* was found here on 27 June 2020, accompanied by *Catops fuliginosus* Erichson (Leioidae).

***Heterothops binotatus* (Gravenhorst, 1802)**

SLIGO: Carrowdough, (G602348), 10 April 2015, a male and a female trapped in a hollow on the sand dune foreshore.

***Quedius humeralis* Stephens, 1832**

SLIGO: Barnaderg (G672477), 20 March 2015, a single male sieved from *Sphagnum* in a small patch of remnant blanket bog, with *Coccinella hieroglyphica* Linnaeus (Coccinellidae) also present.

***Quedius nitipennis* (Stephens, 1833)**

LEITRIM: Benbo Mountain (G848376), 11 April 2015, a male sieved from debris at the edge of Black Lough at *circa* 400m.

***Quedius picipes* (Mannerheim, 1830)**

SLIGO: Knocknarea (G617348), 25 June 2015, a male sieved from moss collected in limestone grassland at *circa* 150m.

GEOTRUPIDAE

***Trypocopris vernalis* (Linnaeus, 1758)**

SLIGO: Mullaghmore West (G696542), 1 July 2020, three specimens active on sheep dung. The site was revisited on 11 July 2020, when six individuals were located in sheep and cow

dung. All the specimens were located at the edge of machair grassland where it joins the sand dunes. The species was not located further inland on the machair grassland itself. There is a good supply of sheep and cow dung at this site, which comprises a large area of machair grassland adjoining a narrow band of exposed sand dunes. Johnson and Halbert (1902) describe *Trypocopris* (= *Geotrupes*) *vernalis* as 'local and not common', and there appears to be few if any Irish records from the latter part of the 20th century. *T. vernalis* is listed as Nationally Scarce in Great Britain by Lane and Mann (2016).

SCARABAEIDAE

***Chilothorax conspurcatus* (Linnaeus, 1758) (Fig. 1)**

SLIGO: Carns (G705338), 13 April 2020, three beetles present in horse dung on unimproved, heavily grazed limestone grassland. Johnson and Halbert (1902) listed this beetle (= *Aphodius conspurcatus*) as Irish based on a specimen in the National Museum of Ireland which had been in the collection of the 19th century entomologist James Tardy (1782-1835). The species is retained on the most recent Irish list (Anderson, Nash and O'Connor, 1997)) based on this record. However, having studied the Tardy collection, Good (2013) rejected the record, suggesting the origin of the specimen is suspect. The present record therefore confirms the presence of this distinctive dung beetle in Ireland. The commonest dung beetles at the site were *Volinus sticticus* (Panzer) and *Melinopterus sphacelatus* (Panzer), and also present in the horse dung were *Aphodius fimetarius* agg, *Agrilinus ater* (De Geer) as well as *Cercyon melanocephalus* (Linnaeus), *Cryptopleurum minutum* (Fabricius) (Hydrophilidae), *Onthophilus striatus* (Forster) (Histeridae), *Oxytelus laqueatus* (Marsham), *Platystethus arenarius* (Fourcroy), *Philonthus varians* (Paykull) and *Quedius cinctus* (Paykull) (Staphylinidae). *C. conspurcatus* is listed as Nationally Scarce in Great Britain by Lane and Mann (2016) who suggest it is a winter active beetle and as such likely to be under recorded. I have a number of records of *Volinus sticticus* (Panzer) (= *Aphodius equestris*) from inland sites in Counties Fermanagh, Roscommon and Sligo, occurring in horse, cow and fox dung.

DERMESTIDAE

***Anthrenus verbasci* (Linnaeus, 1767)**

SLIGO: Sligo (G690355), 4 March 2012, a singleton on a bedroom wall. Mercifully no further specimens located. There are remarkably few published Irish records of this notorious pest.

PTINIDAE

***Trigonogenius globosus* (Solier, 1849)**

DUBLIN: Smithfield (O1434), 1 October 2001, a singleton on the inside wall of an apartment.

Other Irish records for this alien spider beetle also relate to Dublin City (O'Connor, 1981; O'Mahony, 1924).

***Ochina ptinoides* (Marsham, 1802)**

SLIGO: Beanfield (G652312), 20 May 2020. Culleenamore (G610340), 30 June 2020, beaten from *Hedera* in both cases.

CLERIDAE

***Necrobia violacea* (Linnaeus, 1758)**

SLIGO: Hazelwood (G711361) 25 May 2020, a singleton on the rotting lower portion of a deer limb, dumped on a patch of waste ground bordering carr woodland.

NITIDULIDAE

***Omosita discoidea* (Fabricius, 1775)**

LEITRIM: Acres Lake (G967102), 23 April 2011, attending *Crataegus* blossoms in a hedgerow.

SLIGO: Cummeen (G648369), 6 June 2013, under sheep bones on the estuarine foreshore.

CRYPTOPHAGIDAE

***Antherophagus pallens* (Linnaeus, 1758)**

SLIGO: Mullagh,more (G707545) 11 July 2020, single specimen collected from the nest of the bumble bee *Bombus lucorum* which had been broken into, presumably by a predator. The specimen was identified using Duff (2020) who suggests that old records under this name may refer to *Antherophagus similis* Curtis.

COCCINELLIDAE

***Chilocorus bipustulatus* (Linnaeus, 1758)**

SLIGO: Cleaveragh (G713343), 6 June 2014, swept from *Myrica* in wetland bordering the River Garavogue.

***Adalia bipunctata* (Linnaeus, 1758)**

This ladybird may have been present in the west of Ireland for rather longer than the information contained in Cotton, Dunleavy and Govier (2015) would suggest, for I have a record of a specimen in a bus in Eyre Square, Galway City (M3025), 23 June 1996, which I secured on arrival in Sligo Town. Roy *et al.* (2012) map this beetle as being reasonably widespread along the south coast and in the north east. Although clearly on the increase, it remains quite scarce on the ground in southern counties (personal observation).

TENEBRIONIDAE

***Lagria hirta* (Linnaeus, 1758)**

SLIGO: Cloonagh (G5846), 15 August 2020, scattered on coastal vegetation. Culleenamore (G610340), 30 June 2020, relatively frequent on vegetation in the sandy foreshore. Pollbrean (G420361), 18 July 2015, a singleton beaten from vegetation on a coastal roadside bank.

Until recently the only north-west record for this distinctive beetle was from the Lough Foyle district (Buckle, 1900), however these new records and that contained in Cawley (2014) suggest a more widespread occurrence in these parts. The species is, seemingly, on the increase in Great Britain (Duff, 2020). Possibly the same is happening in Ireland, away from its strongholds in the south and east.

CERAMBYCIDAE

***Leiopus nebulosus* (Linnaeus, 1758)**

SLIGO: Cullentra Oak Wood (G7733), 9 September 1989, D. C. F. Cotton.

Irish records for this uncommon beetle are summarized by Alexander and Anderson (2012).

Five additional species of longhorn beetle have been recorded from County Sligo. *Grammoptera ruficornis* (Fabricius) is common on *Crataegus* blossoms early in the summer and likely to be present in most 10km squares. *Rhagium bifasciatum* Fabricius is also widespread, often found in rotting stumps, and not confined to woodlands. *Alosterna tabacicolor* (DeGeer) has been reported on a few occasions from Slish Wood, and could be under recorded. *Rutpela maculata* (Poda) and *Rhagium mordax* (DeGeer) are both scarce beetles, largely confined to good quality woodlands around Lough Gill and in Union Wood.

CHRYSOMELIDAE

***Oomorphus concolor* (Sturm, 1807)**

SLIGO: Dooney Rock (G7232), 27 May 2020, swept from *Allium ursinum* in open deciduous woodland.

***Longitarsus rubiginosus* (Foudras, 1860)**

SLIGO: Sligo Town (G690354), 28 September 2020, males and gravid females present in numbers on *Calystegia sepium* in a town garden.

The species is listed as Irish by Anderson, Nash and O'Connor (1997), seemingly based on a County Galway find contained in Chaster (1903). Flea beetles are frequent on bindweed in these parts and this beetle could well be greatly under recorded.

CURCULIONIDAE

***Miarus campanulae* (Linnaeus, 1767)**

SLIGO: Lower Rosses (G631419), 31 May 2020, frequent on oxeye daisy *Leucanthemum vulgare* flowers at the edge of the sand dunes. Previous searches for this weevil had been unsuccessful; however in retrospect my timing was wrong as I was searching when the larval food plant harebell *Campanula rotundifolia* was in flower. This plant is widespread if somewhat local in these parts and there must be considerable scope for finding new sites for *Miarus* early in the season.

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Thanks to Myles Nolan who read over a draft of this paper. Mike Cox confirmed the identity of *Longitarsus rubiginosus*. Don Cotton allowed inclusion of his record of *Leiopus nebulosus*. Thanks to my cat Tigerlily for kindly supplying the field mouse. The DMAP was prepared by J. P. O'Connor using a software programme provided by Alan Morton.

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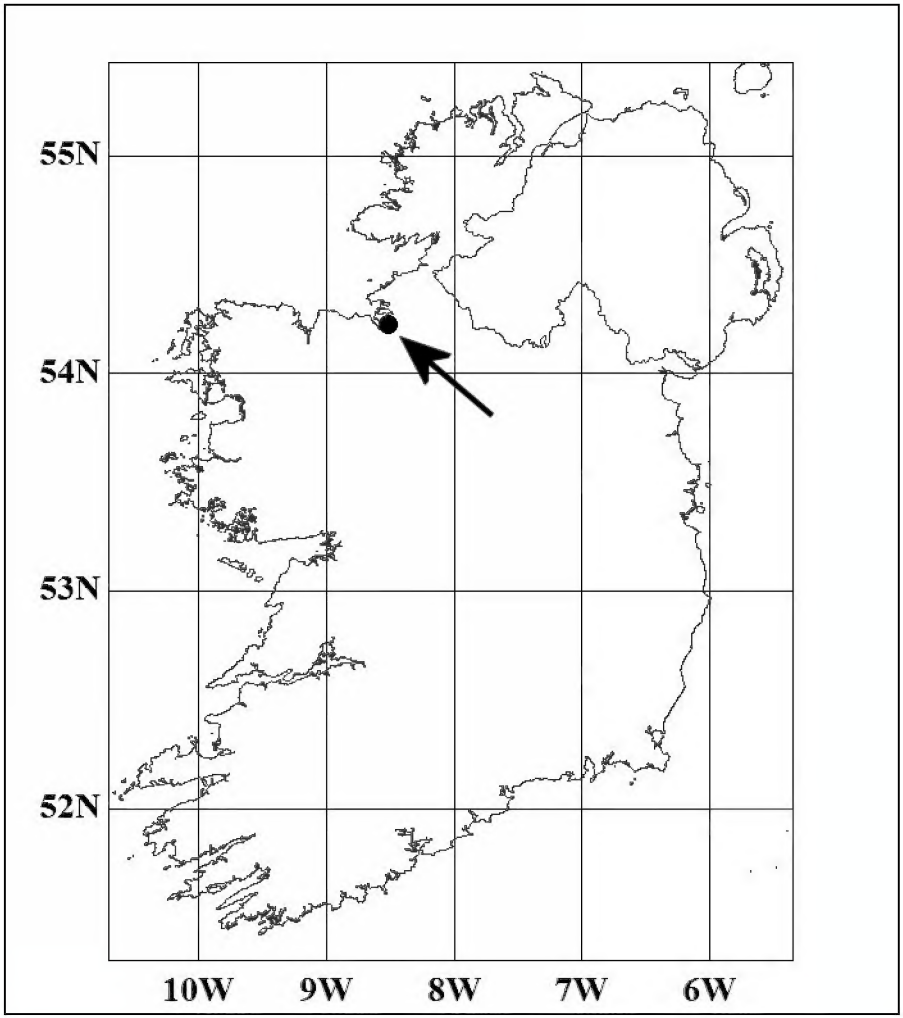

FIGURE 1. The Sligo record of *Chilothorax conspurcatus* (Linnaeus, 1758).

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MISCELLANEOUS IRISH CADDISFLY (TRICHOPTERA) RECORDS MAINLY FROM NATIONAL RIVER MONITORING WORK

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Abstract

Records are presented based mainly on caddisflies (Trichoptera) taken randomly by HBF on some Irish rivers during national Water Framework Directive monitoring surveys. These field collections have provided some very useful distributional data including new hectad and county records. The opportunity has also been taken to include some other records.

Key words: Trichoptera, caddisflies, Ireland, distribution, county records, Environmental Protection Agency.

Introduction

The Environmental Protection Agency conducts the national Water Framework Directive monitoring programme in Ireland (e.g. O'Boyle *et al*., 2019) by which river water quality and trends are assessed with respect to ecological criteria and to physico-chemical water quality standards. All of the major rivers and their more important tributaries are included in the programme. The biological programme covers a channel length of approximately 13,200km and involves sampling at some 2,300 stations. The survey cycle is completed every three years.

During routine sampling as part of this programme, HBF took the opportunity to collect some caddisflies that he observed on several rivers. The visited rivers are mostly in areas seldom sampled for adult Trichoptera and although random captures, they have provided some very useful distributional data including new hectad and county records. The opportunity has also been taken to include some other records sent to JPOC.

Unless otherwise stated, specimens were identified by the senior author. The specimens were determined using Malicky (2004) and, Barnard and Ross (2012). Voucher material of the rarer species has been retained in the O'Connor collection.

All the records will be forwarded to the National Biodiversity Data Centre in Addendum 5 to the dataset "Caddisflies (Trichoptera) of Ireland" (O'Connor, 2020).

Family RHYACOPHILIDAE

***Rhyacophila dorsalis* (Curtis, 1834)**

LAOIS: Glenlahan River, Clarahill Bridge (N3410), 1♂ 8 June 2020, H. B. Feeley.

Family GLOSSOSOMATIDAE

***Agapetus delicatulus* McLachlan, 1884**

LAOIS: Douglas River, bridge downstream of Gale's Bridge (Coolanagh) (S6883), 2♂♂ 16 June 2020; Owenass River, bridge north of Irishtown House on the N88 (N4507), 1♂ 9 June 2020, all H. B. Feeley.

WICKLOW: River Slaney, Kelsha Bridge (S9394), 1♂ 14 July 2020, H. B. Feeley.

***Agapetus fuscipes* Curtis, 1834**

CARLOW: Aghalona River, bridge near Moatalusha House (S8072), 1♂ 18 June 2020; Aughnabrisky River, downstream of Scullogue Bridge (S8148), 1♂2♀♀ 25 June 2020; Ballyroughan Little River, bridge south-west of Ballyroughan Little (S7446), 1♂ 29 June 2020 all H. B. Feeley.

DUBLIN: Delvin River, bridge north-west of Forty Acres (O1463), 1♂ 8 July 2010, H. B. Feeley.

KILKENNY: River Gowran, bridge at the west side of Gowran (S6253), 9♂♂1♀ 24 June 2020, bridge east of Freneystown (S5959), 1♂ 23 June 2020, all H. B. Feeley.

LAOIS: Owenass River, bridge north of Irishtown House on the N88 (N4507), 1♂ 9 June 2020; Stradbally River, bridge north-west of Ballintlea (S5389), 3♂♂1♀ 15 June 2020, all H. B. Feeley.

MEATH: Mosney River, south of Mosney House (O1569), 4♂♂1♀ 8 July 2020; Nanny River, upstream of Beaumont Bridge (O0769), 1♂ 8 July 2020, all H. B. Feeley.

OFFALY: Enaghan Stream, bridge upstream of the Coolnagillagh stream confluence (N5316), 1♀ 4 June 2020, H. B. Feeley.

WEXFORD: Aughnacrew River, Ballinvegga Bridge (S7932), 1♂ 30 June 2020, bridge just upstream of the Pollmounty River confluence (S7634), 1♂1♀ 30 June 2020, all H. B. Feeley.

***Glossosoma boltoni* Curtis, 1834**

KILKENNY: Duisk River, bridge in Graiguenamanagh (S7043), 1♀ 29 June 2020, H. B. Feeley.

***Glossosoma conformis* Neboiss, 1963 New to County Offaly (Fig. 1)**

OFFALY: Rathgibbon South, Killyon (N1306), 1♀ 17 September 2020, light-trap, R. Mc Kenna.

Family PHILOPOTAMIDAE

***Philopotamus montanus* (Donovan, 1813)**

WEXFORD: Askinvillar Stream, Askinvillar Bridge (S8445), 1♀ 15 July 2020, H. B. Feeley.

***Wormaldia occipitalis* (Pictet, 1834)**

WEXFORD: Askinvillar Stream, Askinvillar Bridge (S8445), 1♂ 15 July 2020, H. B. Feeley.

Family POLYCENTROPODIDAE

***Polycentropus flavomaculatus* (Pictet, 1834)**

CARLOW: Aghalona River, bridge north-east of Grangeford (S8175), 2♂♂ 18 June 2020; Ballyroughan Little River, bridge south-west of Ballyroughan Little (S7446), 6♂♂1♀ 29 June 2020, all H. B. Feeley.

DUBLIN: Ballyboghill River, bridge in Ballyboghill (O1553), 1♀ 13 July 2020; Broadmeadow River, bridge near the waterworks (O1848), 1♂ 9 July 2020, all H. B. Feeley.

KILKENNY: River Barrow, Ballyteigelea Bridge (S7150), 1♂ 29 June 2020, H. B. Feeley.

LAOIS: Crooked Stradbally, second bridge upstream of the Stradbally River confluence (S5694), 1♂ 15 June 2020; Fushoge River, bridge south of Crockaun (S6975), 1♂ 1 June 2020; Glenlahan River, Clarahill Bridge (N3410), 2♀♀ 8 June 2020; Owenass River, bridge north of Irishtown House on the N88 (N4507), 1♂ 9 June 2020; Stradbally River, Bauteoge Bridge (S5593), 2♂♂ 15 June 2020, all H. B. Feeley.

MEATH: Hurley River, just upstream of the Nanny River confluence (O0365), 3♂♂ 7 July 2020; Nanny River, bridge north-east of Bellewstown House (O0769), 1♂ 8 July 2020, all H. B. Feeley.

***Polycentropus irroratus* (Curtis, 1835)**

LAOIS: Stradbally River, Bauteoge Bridge (S5593), 1♂ 15 June 2020, H. B. Feeley.

Family PSYCHOMYIIDAE

***Lype phaeopa* (Stephens, 1836)**

MEATH: Hurley River, just upstream of the Nanny River confluence (O0365), 1♂ 7 July 2020, H. B. Feeley.

***Psychomyia pusilla* (Pictet, 1834)**

CARLOW: Ballyroughan Little River, bridge south-west of Ballyroughan Little (S7446), 1♂ 29 June 2020, H. B. Feeley.

***Tinodes maculicornis* (Pictet, 1834) (Fig. 2)**

DUBLIN: Broadmeadow River, west-south-west of Fieldstown House (O1050), 1♂ 9 July 2020, H. B. Feeley.

Tinodes maculicornis was first found in County Dublin in July 2019 when a male was taken in a Rothamsted light-trap operated in Dublin Zoo (O1235) (O'Connor and O'Connor, 2019).

KILKENNY: River Barrow, Ballyteigelea Bridge (S7150), 1♂ 29 June 2020, H. B. Feeley.

***Tinodes waeneri* (Linnaeus, 1758)**

DUBLIN: Ballyboghill River, bridge in Ballyboghill (O1553), 1♀ 13 July 2020; Broadmeadow River, west-south-west of Fieldstown House (O1050), 1♂ 9 July 2020, all H. B. Feeley.

Family HYDROPSYCHIDAE

***Hydropsyche angustipennis* (Curtis, 1834)**

MEATH: Nanny River, upstream of Beaumont Bridge (O0769), 1♂ 8 July 2020, H. B. Feeley.

***Hydropsyche instabilis* (Curtis, 1834) New to Counties Kilkenny and Laois (Fig. 3)**

KILKENNY: River Duiske, Aghclare Bridge (S6844), 1♀ 20 June 2020, H. B. Feeley.

LAOIS: Stradbally River, Bauteoge Bridge (S5593), 1♀ 15 June 2020, H. B. Feeley.

***Hydropsyche siltalai* Döhler, 1963**

DUBLIN: Delvin River, bridge north-west of Forty Acres (O1463), 1♂ 8 July 2010, H. B. Feeley.

LAOIS: Stradbally River, bridge west-north-west of Ballykilevan House (S5997), 1♂ 15 June 2020, H. B. Feeley.

MEATH: Hurley River, Rathfeigh, Oldbridge (N9962), 1♀ 7 July 2020, H. B. Feeley.

Family GOERIDAE

***Goera pilosa* (Fabricius, 1775)**

LAOIS: Douglas River, bridge downstream of Gale's Bridge (Coolanagh) (S6883), 2♂♂ 16 June 2020, H. B. Feeley.

MEATH: Hurley River, just upstream of the Nanny River confluence (O0365), 2♂♂ 7 July 2020, H. B. Feeley.

***Silo pallipes* (Fabricius, 1781)**

CARLOW: Aughnabrisky River, downstream of Scullogue Bridge (S8148), 1♂1♀ 25 June 2020, H. B. Feeley.

WICKLOW: River Slaney, Kelsha Bridge (S9394), 2♀♀ 14 July 2020, H. B. Feeley.

Family LEPIDOSTOMATIDAE

***Lepidostoma basale* (Kolenati, 1848) New to County Carlow (Fig. 4)**

CARLOW: Ballyroughan Little River, bridge south-west of Ballyroughan Little (S7446), 1♂ 29 June 2020, H. B. Feeley.

Family LIMNEPHILIDAE

***Limnephilus auricula* Curtis, 1834**

OFFALY: Rathgibbon South, Killyon (N1306), 1♂ 17 September 2020 & 1♀ 19 September 2020, light-trap, R. Mc Kenna.

***Limnephilus lunatus* Curtis, 1834**

OFFALY: Killaun Bog (N1005), 1♀ 16 September 2020, seen flying along a wet, unvegetated ditch separating high, vegetated raised bog and cutover bare peat, collected and determined M. Nolan; Rathgibbon South, Killyon (N1306), 1♂ 19 September 2020, light-trap, R. Mc Kenna.

***Limnephilus sparsus* Curtis, 1834**

CORK: Fota Wildlife Park (W7871), 1♂1♀ 14-20 September 2020, Rothamsted Insect Survey light-trap, per A. Riley.

***Stenophylax permistus* McLachlan, 1895 New to County Laois (Fig. 5)**

LAOIS: Glenlahan River, Clarahill Bridge (N3410), 1♀ 8 June 2020, H. B. Feeley.

Family SERICOSTOMATIDAE

***Sericostoma personatum* (Spence, 1826)**

CARLOW: Burren River, bridge north-west of Ballycrogue (S7374), 1♀ 18 June 2020, H. B. Feeley.

DUBLIN: Delvin River, bridge north-west of Forty Acres (O1463), 1♂ 8 July 2010, H. B. Feeley.

MEATH: Hurley River, just upstream of the Nanny River confluence (O0365), 2♂♂ 7 July 2020; Nanny River, bridge north-east of Bellewstown House (O0769), 1♂ 8 July 2020, upstream of Beaumont Bridge (O0769), 2♀♀ 8 July 2020, all H. B. Feeley.

OFFALY: Daingean River, bridge east of Mount Lucas House (N5227), 1♀ 3 June 2020, H. B. Feeley.

Family ODONTOCERIDAE

***Odontocerum albicorne* (Scopoli, 1763)**

CARLOW: Ballyroughan Little River, bridge south-west of Ballyroughan Little (S7446), 1♀ 29 June 2020, H. B. Feeley.

Family LEPTOCERIDAE

***Athripsodes aterrimus* (Stephens, 1836)**

MEATH: Hurley River, just upstream of the Nanny River confluence (O0365), 1♂ 7 July 2020; Nanny River, bridge north-east of Bellewstown House (O0769), 1♀ 8 July 2020, all H. B. Feeley.

OFFALY: Daingean River, bridge east of Mount Lucas House (N5227), 1♀ 3 June 2020, H. B. Feeley.

***Athripsodes cinereus* (Curtis, 1834) (Fig. 6)**

CARLOW: Burren River, Ballintrane Bridge (S7967), 1♀ 22 June 2020, bridge north-west of Ballycrogue (S7374), 1♀ 18 June 2020; River Barrow, Royal Oak Bridge (S6861), 4♂♂ 23 June 2020, all H. B. Feeley.

DUBLIN: Broadmeadow River, bridge near the waterworks (O1848), 2♂♂ 9 July 2020; Ward River, bridge north of Killeek (O1446), 5♂♂ 13 July 2020, all H. B. Feeley.

KILKENNY: River Barrow, Ballyteigelea Bridge (S7150), 1♂ 29 June 2020, H. B. Feeley.

LAOIS: Douglas River, bridge downstream of Gale's Bridge (Coolanagh) (S6883), 2♂♂ 16 June 2020, H. B. Feeley.

MEATH: Nanny River, bridge north-east of Bellewstown House (O0769), 1♂5♀♀ 8 July 2020, H. B. Feeley.

OFFALY: River Barrow, Kilnahown Bridge (S5110), 3♂♂1♀ 10 June 2020, H. B. Feeley.

***Mystacides azurea* (Linnaeus, 1761) (Fig. 7)**

CARLOW: Ballyroughan Little River, bridge south-west of Ballyroughan Little (S7446), 1♀ 29 June 2020, H. B. Feeley.

DUBLIN: Ballyboghill River, bridge in Ballyboghill (O1553), 1♂ 13 July 2020, H. B. Feeley.

MEATH: Dunshaughlin Stream, Cookstown Bridge (O0452), 3♂♂ 9 July 2020; Hurley River, just upstream of the Nanny River confluence (O0365), 3♂♂1♀ 7 July 2020, Rathfeigh, Oldbridge (N9962), 2♂♂ 7 July 2020, all H. B. Feeley.

OFFALY: River Barrow, Kilnahown Bridge (S5110), 1♂ 10 June 2020, H. B. Feeley.

WEXFORD: Boro River, Ballymackesy Bridge (S8935), 2♂♂ 30 June 2020, H. B. Feeley.

WICKLOW: River Slaney, Waterloo Bridge (S9093), 1♂ 14 July 2020, H. B. Feeley.

***Oecetis testacea* (Curtis, 1834) New to County Carlow (Fig. 8)**

CARLOW: Ballyroughan Little River, bridge south-west of Ballyroughan Little (S7446), 1♂ 29 June 2020, H. B. Feeley.

Acknowledgements

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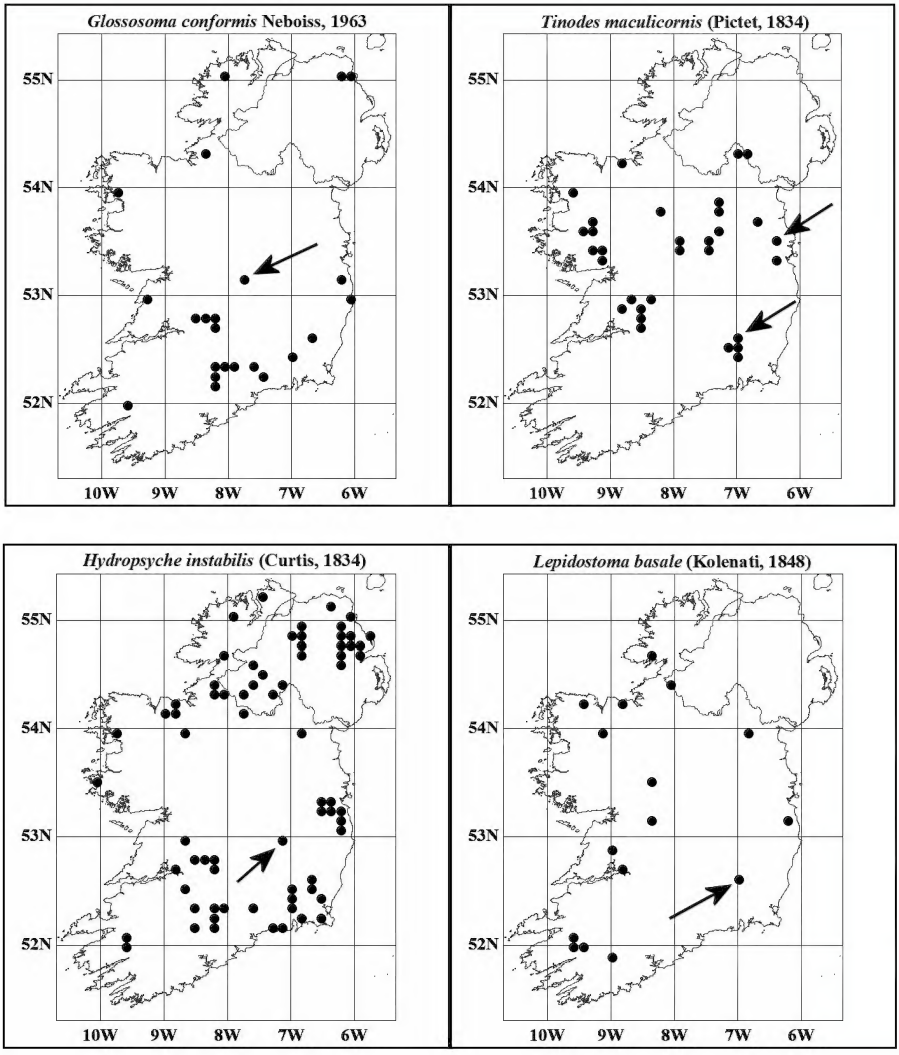
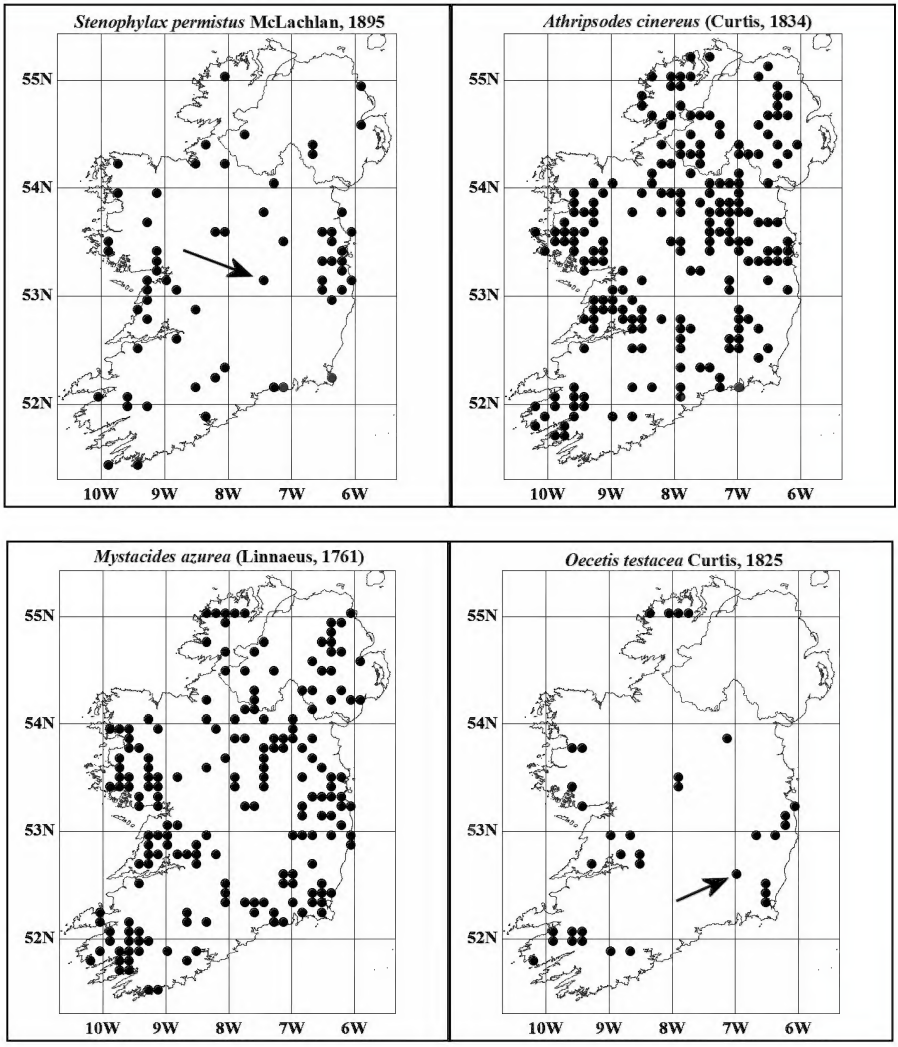


FIGURES 1-4. The known Irish distributions of *Glossosoma conformis* Neboiss, 1963, *Tinodes maculicornis* (Pictet, 1834), *Hydropsyche instabilis* (Curtis, 1834) and *Lepidostoma basale* (Kolenati, 1848). Significant records are indicated by arrows.



FIGURES 5-8. The known Irish distributions of *Stenophylax permistus* McLachlan, 1895, *Athripsodes cinereus* (Curtis, 1834), *Mystacides azurea* (Linnaeus, 1761) and *Oecetis testacea* (Curtis, 1834). Significant records are indicated by arrows.

BOOK REVIEW

Atlas of water beetles of Britain and Ireland - smaller families of Polyphaga by G. N. Foster, D. T. Bilton, M. Hammond and B. H. Nelson. FSC Publications, Telford, UK. 2020. ISBN 978 1 906698-69-0. 175 x 250mm format, soft cover. 296pp including 86 maps, 42 photographs and three colour paintings/drawings. Available from FSC Publications at <www.field-studies-council.org/publications> for £25 plus postage.

Some time ago, Leif Lyneborg (1977) introduced his book on *Field and Meadow Life* with the reflection that many naturalists have a preference for getting their feet wet (in water) rather than their hands dirty (in soil), and this book would seem to prove the point, with well-represented recording coverage for what might be considered obscure groups of small water beetles. This is, also, it must be said, due to the particular ability of the authors to encourage recording of these beetle families over many years, the results of which are now accessible in an informative, interesting and ecologically well-illustrated volume.

The book is the third in a trilogy which summarises and maps water beetle habitat and distribution (the first two being Foster, Bilton and Nelson (2016) and Foster *et al.* (2018)). The core of the atlas is the series of 84 10km^2 species distribution maps (and one map of the Channel Islands in the case of one rare species), covering 85 species of water beetles, 53 of which have been recorded from Ireland. Each map is accompanied by detailed text on taxonomy and identification, life-cycle, habitats and distribution and in many cases natural enemies. Photographs of the habitats are provided, noting the species recorded therein, for many species. The introductory section of the book contains acknowledgement of 334 named recorders, an overview of recording and biology. In addition, an up-to-date table of *all* water beetles (Hydradephaga, Hydrophiloidea plus the families included in this volume), with their occurrence in Great Britain, Ireland, the Isle of Man and the Channel Islands, and their respective conservation status in Britain and Ireland, is given, replacing that in Foster *et al.* (2018). An impressive bibliography of 709 references, and a full generic and species index is also provided.

The modest title of 'atlas' does not do justice to the detailed and comprehensive species accounts which accompany each map of recorded distribution. The ecologically important, but often neglected, trait of flight ability is mentioned, as well as many other aspects of biology (such as microbial parasites) not normally summarised. Although regional gaps remain, Ireland is well-represented by up-to-date records, having, for instance, 18 of the 20 British scirtid species recorded since 2000. The use of grey-filled circles is particularly welcome (avoiding the confusion that can arise, when open circles are used, with naturally circular islands and bays!). The statuses of all Irish species are tabulated, and records cited by Johnson and Halbert (1902) are mentioned. Habitat range can be seen from the substantial number of habitat photographs,

with a proportion from Ireland. There are also many fascinating snippets of tangential information (for instance, we can now know (p. 18) that it was Stephens (1792-1852), rather than an apocryphal more recent Irish entomologist, who was originally attributed with dismissing any feature that could not be seen though a pocket lens). Last but not least, the book is of a convenient size that handles easily.

Perhaps the only critical comment is that more guidance on identification for readers unfamiliar with the families covered in the volume would have been useful. Unlike both of its predecessors, there is no single companion volume with identification keys to the genera and species covered in the atlas. In the introductory section of the previous volume (Foster *et al.*, 2018: 2), the two keys works in English are cited. However, no key works are mentioned in this volume under the introductory 'Identification' sub-heading, and one has to reach the generic introductions before finding reference to key works. The only cited English-language key to the dryopids (Olmi, 1972) is missing from the references, and the forthcoming (but by now published) volume of *Beetles of Britain and Ireland* covering dryopids (Duff, 2020) is not mentioned.

The only other minor errors I noticed were that the River Faughan record of *Hydraena pulchella* is not mapped (p. 37, but it is clearly cited in the text), and *Hydraena britteni* and the up-to-recently used *Enicocerus* are missing from the index. Notwithstanding the above very minor points, this excellent, comprehensive and stimulating series of books can be unhesitatingly recommended to entomologists, aquatic biologists, and ecologists.

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Jervis Good

NEW PUBLICATION

A national grid atlas of the Irish caddisflies (Trichoptera)

by James P. O'Connor

This atlas complements *A catalogue and atlas of the caddisflies (Trichoptera) of Ireland*. The publication contains distribution maps for all the 156 Irish species along with a revised checklist and notes on habitats and flight periods. There is also a revised list of county records. The maps are based on 16,067 records.

Published as *Occasional Electronic Publication* **Number 1** on 1 June 2020 by the Irish Biogeographical Society, Dublin. 202 Pdf pages. ISBN 978-1-9164218-0-6.

Down load at <http://www.irishbiogeographicalsociety.com/pdf/IBSNationalgridatlasIrishcaddisfliestrichoptera.pdf>

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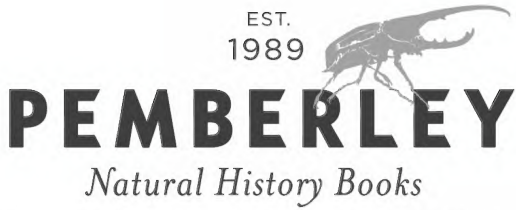

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